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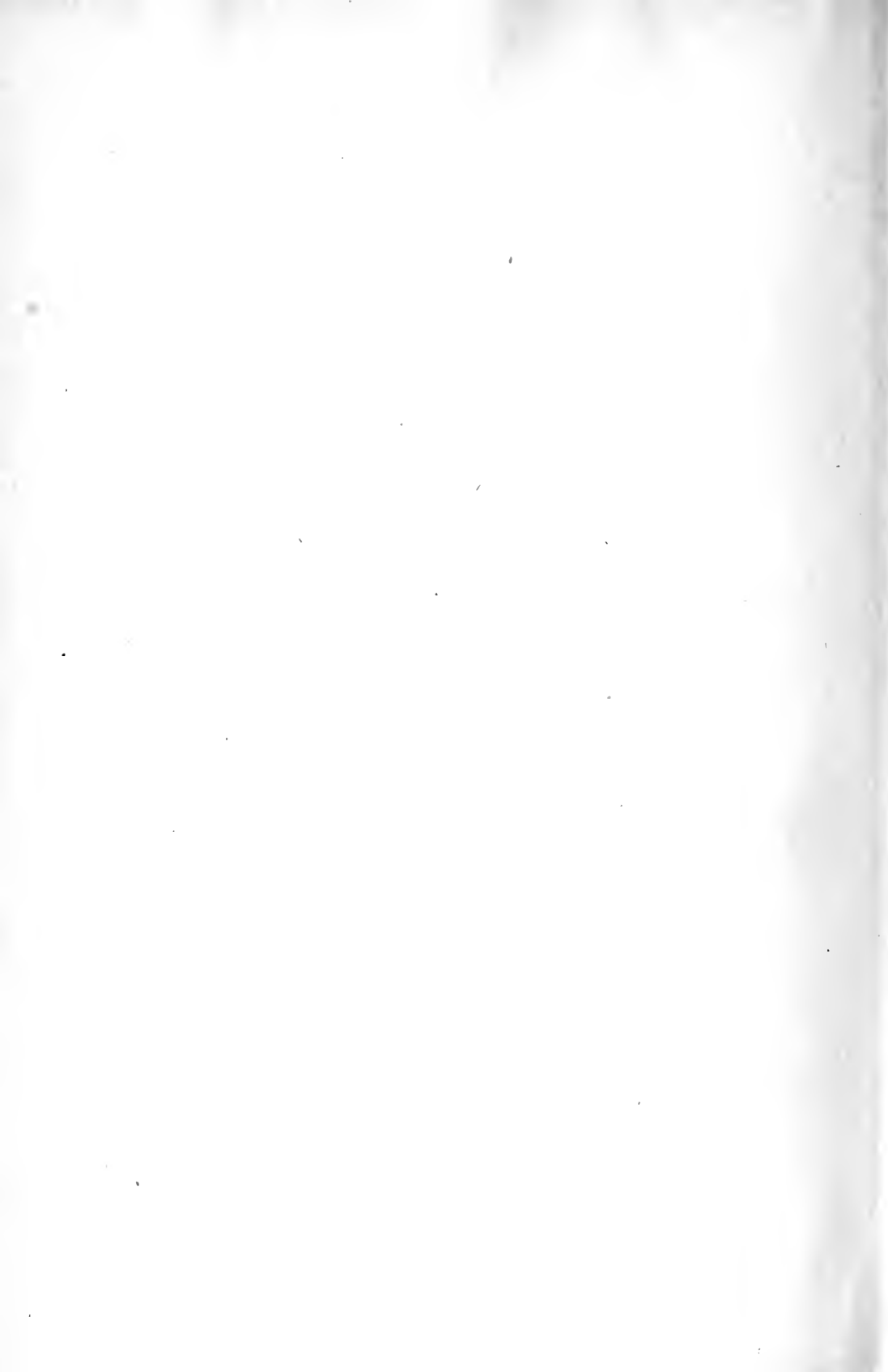
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EIGHTEENTH

ANNUAL REPORT

OF THE

STATE BOARD OF HEALTH

OF THE

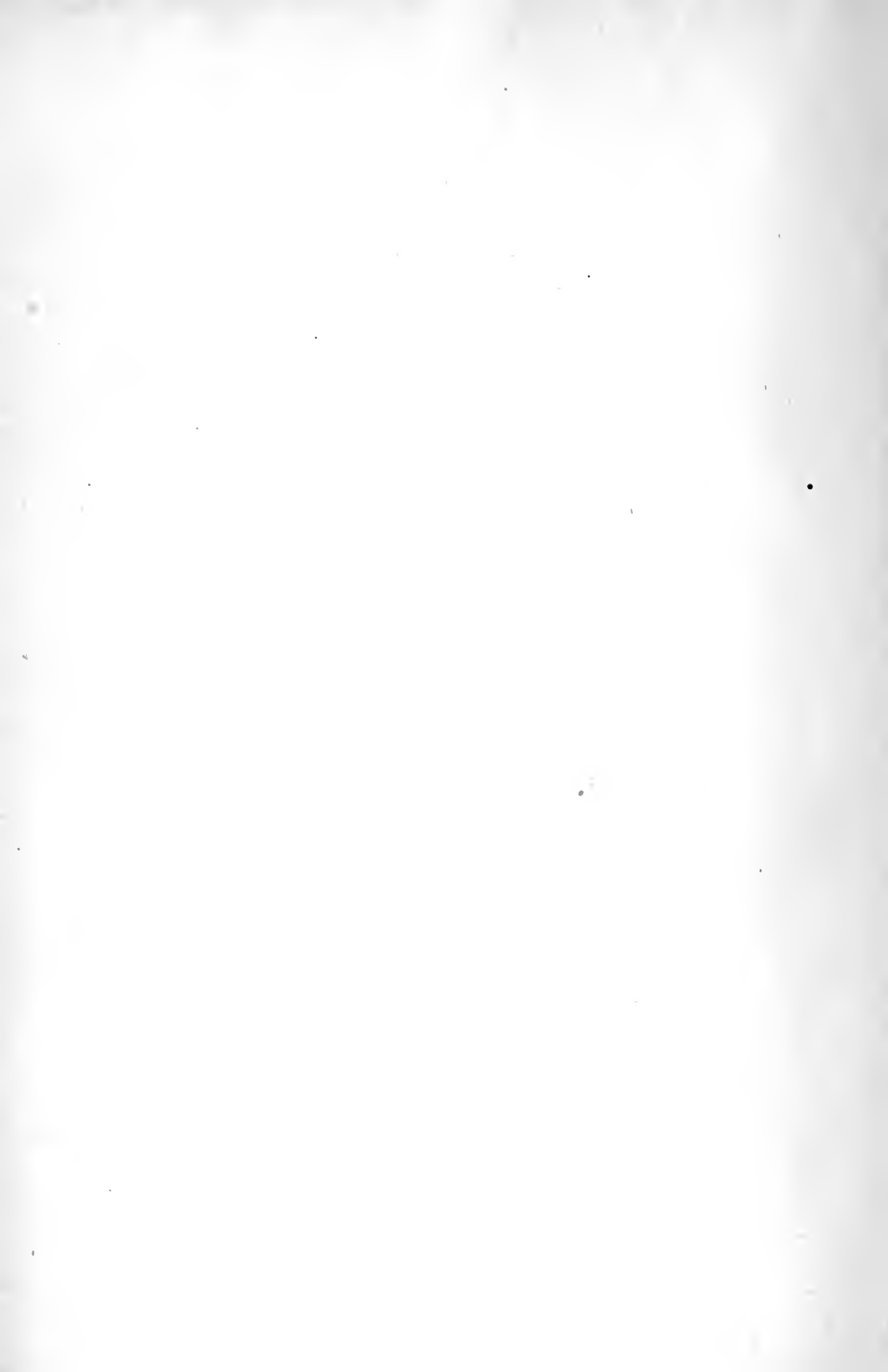
STATE OF OHIO

FOR THE

YEAR ENDING DECEMBER 31st, 1903.



Springfield, Ohio:
The Springfield Publishing Company,
State Printers.
1904.



LETTER OF TRANSMITTAL.

OHIO STATE BOARD OF HEALTH.
OFFICE OF THE SECRETARY.

COLUMBUS, May 7th, 1904.

To His Excellency, MYRON T. HERRICK, Governor of Ohio:

SIR:—In accordance with Section 8 of an "Act to create and establish a State Board of Health," as amended May 7th, 1902, the accompanying report, which is for the calendar year, 1903, is herewith submitted.

Respectfully,

C. O. PROBST,
Secretary.

MEMBERS OF THE OHIO STATE BOARD OF HEALTH.

J. C. CROSSLAND, M. D., *President*, Zanesville.....December, 1903
WM. T. MILLER, M. D., *Vice-President*, Cleveland.....December, 1904
FRANK WARNER, M. D., Columbus.....December, 1905
W. C. CHAPMAN, M. D., Toledo.....December, 1906
JOSIAH HARTZELL, Ph. D., Canton.....December, 1907
DARWIN G. PALMER, M. D., Geneva.....December, 1908
BYRON STANTON, M. D., Cincinnati.....December, 1909
C. O. PROBST, M. D., *Secretary*.

Dr. J. C. Crossland was reappointed.

GENERAL REPORT.

This is the eighteenth annual report of the State Board of Health, and is for the year ending December 31st, 1903. As the report includes annual reports of local boards of health, many of which are tardy in coming in, there has of necessity been some delay in its transmittal. This can make little difference, however, so long as the public printing is delayed as it now is. The annual report of this Board for the year ending December 31st, 1902, has not yet been printed.

PERSONNEL OF THE BOARD.

There has been no change in the personnel of the Board since the last report. The term of office of Dr. J. C. Crossland having expired December 13th, 1903, he was reappointed by Governor Herrick, for the term of seven years.

MEETINGS.

Four meetings were held during the year; three in Columbus and one in Cleveland. A full report of the Board's proceedings will be found on subsequent pages.

In accordance with the established custom, an annual conference, the thirteenth, with local boards of health was held in Columbus in connection with the regular January meeting. There was a large attendance, and the papers and discussions were fully up to the average. These were printed in full in the *Ohio Sanitary Bulletin*, of which ten thousand copies were distributed.

It was our former custom to print these papers and discussions in the annual reports of the Board as well as in the *Bulletin*, but they have been omitted in order to keep the annual report down to a reasonable size.

SMALLPOX.

The epidemic of smallpox has continued; a larger number of cases having been reported for 1903 than for any other year. There were 6,903 cases and 287 deaths reported during the year, which equals a death rate of 4.16 per cent. This is considerably higher than for any year ex-

cept 1902, when it was 6.3 per cent. The comparative high death rate for 1902 is attributable to the large number of deaths in Cleveland where the disease prevailed in a very malignant form.

Everything possible has been done to put a stop to the epidemic. The reasons why this has been impossible have been fully set forth in former reports. The same conditions still exist. In spite of the fact that smallpox has been epidemic in this and other states since 1898 there are still a large number of unvaccinated, that is, susceptible persons, in almost every community. The cases, in general, have been very mild, exciting little alarm. There have been many mistakes in diagnosis, by which the disease has often gotten a good start, and, here and there, there have been physicians who have refused to recognize it or treat it as smallpox.

Following is a table showing the counties and places invaded by smallpox, and the number of cases reported during the year ending December 31st, 1903:

CASES AND DEATHS OF SMALLPOX REPORTED TO THE STATE BOARD
OF HEALTH FROM JANUARY 1, TO DECEMBER 31, 1903.

County.	Place.	Cases.	Deaths.
Adams	Franklin Township	8	.....
	Green Township	5	.....
	Jefferson Township	1	.....
	Manchester	1	.....
	Meigs Township	2	1
	Peebles	6	2
	Sprigg Township	62	1
	Tiffin Township	11	.....
	Wayne Township	8	1
	Amanda Township	1	.....
	Auglaize Township	41	.....
	Bluffton	1	.....
	German Township	1	.....
Allen	Jackson Township	1	.....
	Lima	20	.....
	Spencerville	38	.....
	Sugar Creek Township	2	.....
	Waynesfield	1	.....
Ashtabula	West Cairo	2	.....
	Ashtabula	3	1
	Conneaut	1	.....
	Conneaut Township	1	.....
Athens	Athens	33	8
	Athens Township	7	1
	Buchtel	7	1
	Dover Township	8	.....
	Lodi Township	1	.....
	Nelsonville	19	5
	Rome Township	1	.....
	Trimble	1	1
	Waterloo Township	5	2
	York Township	23	4
Auglaize	Moulton Township	2	.....
	Noble Township	26	1
	St. Marys	3	.....
	Salem Township	9	.....
	Washington Township	5	.....
	Wayne Township	1	.....

CASES AND DEATHS OF SMALLPOX REPORTED, ETC.—Continued.

County.	Place.	Cases.	Deaths.
Belmont	Barnesville	3	.....
	Bellaire	50	9
	Martin's Ferry	6	1
	Mead Township	2	.....
	Pultney Township	3	1
	Richland Township	1	.....
	St. Clairsville	1	.....
Brown	Aberdeen	6	1
	Byrd Township	1	.....
	Franklin Township	3	.....
	Georgetown	3	.....
	Huntington Township	11	1
	Lewis Township	3	.....
	Pleasant Township	6	.....
	Scott Township	1	1
	Sterling Township	3	3
Butler	Union Township	4	1
	Hamilton	56	3
	Lemon Township	9	.....
	Liberty Township	10	.....
	Middletown	8	1
	Morgan Township	11	.....
	Relley Township	2	.....
	St. Clair Township	4	.....
	Union Township	6	.....
Carroll	Augusta Township	2	.....
	Brown Township	5	.....
	Loudon Township	4	.....
Champaign	Goshen Township	1	.....
	Harrison Township	1	.....
	Jackson Township	3	.....
	Johnson Township	2	.....
	Mad River Township	2	.....
	Rush Township	3	.....
	Salem Township	15	.....
	St. Paris	2	.....
	Union Township	16	.....
	Urbana	63	.....
Clark	Urbana Township	15	.....
	Bethel Township	1	.....
	Madison Township	12	.....
	Mad River Township	3	.....
	Pleasant Township	12	.....
	Springfield	54	2
	Springfield Township	6	.....
Clermont	Bethel	5	.....
	Felicity	4	.....
	Miami Township	5	.....
	New Richmond	8	2
	Pierce Township	1	.....
	Tate Township	17	.....
Clinton	Midland City	1	.....
	Sabina	3	.....
Columbiana	East Liverpool	18	.....
	Fairfield Township	1	.....
	Hanover Township	1	.....
	Leetonia	1	.....
	Lisbon	1	.....
	Salem Township	1	.....
	Salem	7	.....
	Salineville	5	.....
	Washingtonville	20	.....
	Wellsville	2	.....
	West Township	6	.....

CASES AND DEATHS OF SMALLPOX REPORTED, ETC.—Continued.

County.	Place.	Cases.	Deaths.
Coshocton	Coshocton	20	.....
	Linton Township	7	.....
	Washington Township	3	.....
Crawford	Bucyrus	3	.....
	Chatfield Township	3	.....
	Crestline	6	.....
	Galion	8	.....
	Lykens Township	57	.....
	Tod Township	9	.....
Cuyahoga	Cleveland	105	22
	Collinwood	1	.....
	Euclid Township	2	.....
	West Park	1	.....
Darke	Monroe Township	1	.....
	Yorkshire	1	.....
Defiance	Defiance	8	.....
	Tiffin Township	4	.....
Delaware	Brown Township	2	.....
	Concord Township	2	.....
	Delaware	15	3
	Delaware Township	25	.....
	Radnor Township	1	.....
	Scioto Township	1	.....
	Thompson Township	11	.....
	Troy Township	1	.....
Erie	Oxford Township	4	.....
	Sandusky	9	1
	Vermillion	20	.....
Fairfield	Greenfield Township	1	1
	Lancaster	1	.....
Fayette	Jeffersonville	4	.....
	Madison Township	25	.....
	Paint Township	8	.....
	Perry Township	11	.....
	Union Township	19	.....
	Washington C. H.	48	.....
Franklin	Clinton Township	24	.....
	Columbus	428	59
	Franklin Township	6	1
	Hamilton Township	1	.....
	Lockbourne	2	.....
	Marion Township	55	1
	Perry Township	4	.....
	Reynoldsburg	1	.....
	Truro Township	2	.....
	Westerville	1	.....
Fulton	Clinton Township	8	.....
	Franklin Township	2	.....
	Wauseon	2	.....
Gallia	Addison Township	15	.....
	Clay Township	3	3
	Cheshire Township	9	2
	Gallipolis	11	.....
	Gallipolis Township	4	.....
	Green Township	1	.....
	Guyan Township	27	.....
	Harrison Township	6	1
	Springfield Township	2	.....
Geauga	Walnut Township	3	.....
	Chardon Township	1	.....
	Huntsburg Township	1	.....
Greene	Beaver Creek Township	4	.....
	Cedarville Township	5	1
	Jamestown	1	.....
	Xenia	3	.....

CASES AND DEATHS OF SMALLPOX REPORTED, ETC.—Continued.

County.	Place.	Cases.	Deaths.
Guernsey	Adams Township	5	.....
	Cambridge	106	2
	Cambridge Township	35	.....
	Center Township	1	.....
	Jackson Township	3	.....
	Knox Township	5	.....
	Quaker City	1	.....
	Richland Township	4	.....
	Valley Township	1	1
Hamilton	Addyston	40	.....
	Anderson Township	8	.....
	Cincinnati	338	14
	Cleves	1	.....
	Colerain Township	4	.....
	Columbia Township	2	.....
	Delhi Township	2	1
	Harrison	4	.....
	Hartwell	2	.....
	Lockland	38	.....
	Miami Township	25	.....
	Mill Creek Township	4	.....
	Mt. Washington	1	.....
	Norwood	5	1
	Reading	4	1
	Sycamore Township	7	.....
	Symmes Township	1	.....
	Whitewater Township	2	.....
	Wyoming	2	.....
Hancock	Biglick Township	38	.....
	Delaware Township	3	.....
	Findlay	82	1
	Jackson Township	6	.....
	Liberty Township	1	.....
	Marion Township	7	.....
	Mt. Blanchard	6	.....
	Van Buren	3	.....
	Vanlue	13	.....
	Washington Township	1	.....
Hardin	Allen Township	1	.....
	Ada	3	.....
	Kenton	7	.....
	McDonald Township	1	.....
Harrison	Archer Township	1	.....
	Cadiz	2	.....
	German Township	1	.....
	Green Township	8	2
	Jewett	3	.....
	Monroe Township	2	.....
Henry	Rumley Township	10	.....
	Deshler	2	.....
	Flatrock Township	2	.....
	Freedom Township	5	.....
	Harrison Township	10	.....
	Liberty Township	6	.....
	McClure	2	.....
	Monroe Township	1	.....
	Napoleon	11	.....
	Napoleon Township	2	.....
	Richfield Township	1	.....
	Ridgeville Township	1	.....
Highland	Washington Township	9	.....
	Clay Township	15	1
	Jackson Township	2	.....
	Madison Township	1	.....
	Marshall Township	45	.....
	Washington Township	6	.....

CASES AND DEATHS OF SMALLPOX REPORTED, ETC.—Continued.

County.	Place.	Cases.	Deaths.
Hocking	Green Township	1	1
	Logan	1	.....
Holmes	Glenmont	9	.....
	Knox Township	1	1
Huron	Fairfield Township	2	.....
Jackson	Coal Township	2	.....
	Jackson	28	2
	Jefferson Township	7	.....
	Madison Township	1	.....
	Wellston	18	.....
Jefferson	Mingo Junction	5	1
	Saline Township	13	.....
	Springfield Township	8	1
	Steubenville	55	.....
	Steubenville Township	1	.....
	Toronto	2	.....
Knox	Mt. Vernon	1	.....
Lake	Fairport	1	.....
Lawrence	Aid Township	28	.....
	Elizabeth Township	6	1
	Fayette Township	19	4
	Hamilton Township	33	.....
	Hanging Rock	38	1
	Ironton	340	9
	Lawrence Township	65	3
	Mason Township	35	.....
	Perry Township	24	4
	Proctorville	13	2
	Rome Township	39	2
	South Point	4	1
	Symmes Township	2	.....
	Union Township	19	.....
	Upper Township	95	2
Licking	Harrison Township	9	.....
	Hebron	3	.....
	Newark	36	3
	Pataskala	3	.....
	Union Township	1	.....
Logan	Bellefontaine	1	.....
	Rushsylvania	1	.....
	Stokes Township	5	.....
	West Liberty	3	.....
	Zane Township	1	.....
Lorain	Elyria	4	.....
	Lorain	3	.....
	Oberlin	1	.....
Lucas	Adams Township	8	.....
	Jerusalem Township	10	.....
	Maumee	8	.....
	Oregon Township	62	.....
	Providence Township	2	.....
	Springfield Township	3	.....
	Swanton Township	2	.....
	Toledo	194	6
	Washington Township	4	.....
Madison	Mt. Sterling	7	1
	Pike Township	3	.....
	Pleasant Township	8	1
	Union Township	1	.....
Mahoning	Austintown Township	1	.....
	Jackson Township	5	1
	Sebring	5	.....
	Smith Township	9	3
	Youngstown	131	2
	Youngstown Township	4	.....

CASES AND DEATHS OF SMALLPOX REPORTED, ETC.—Continued.

County.	Place.	Cases.	Deaths.
Marion	Big Island Township	2	.....
	Caledonia	2	.....
	Claridon Township	1	.....
	Grand Prairie Township	16	.....
	Larue	5	.....
	Marion	118	1
	Marion Township	25	.....
	Pleasant Township	5	.....
	Prospect	7	.....
	Prospect Township	7	.....
	Richland Township	9	.....
	Salt Rock Township	1	.....
	Scott Township	2	.....
	Tully Township	1	.....
	Guilford Township	1	.....
	Bedford Township	4	.....
	Lebanon Township	2	.....
Medina	Middleport	7	.....
	Olive Township	11	.....
	Blackcreek Township	4	.....
Mercer	Union Township	2	.....
	Bethel	1	.....
Miami	Brown Township	3	.....
	Casstown	5	.....
	Laura	24	2
	Lost Creek Township	2	.....
	Monroe Township	1	.....
	Newberry Township	1	.....
	Tippecanoe City	31	3
	Union Township	4	.....
	Bethel Township	2	.....
Monroe	Center Township	1	.....
	Ohio Township	2	.....
	Salem Township	1	1
	Switzerland Township	1	.....
	Washington Township	1	.....
	Wayne Township	1	.....
	Centerville	1	.....
Montgomery	Clay Township	11	.....
	Dayton	110	6
	Germantown	1	.....
	German Township	2	.....
	Harrison Township	4	.....
	Jackson Township	8	.....
	Jefferson Township	26	.....
	Mad River Township	18	.....
	Miami Township	1	.....
	Miamisburg	18	4
	Perry Township	7	.....
	Randolph Township	4	.....
	Van Buren Township	18	3
	Bloom Township	1	.....
Morgan	Homer Township	2	.....
	Canaan Township	2	.....
Morrow	Cardington	2	.....
	Cardington Township	1	.....
	Gilead Township	1	.....
	Lincoln Township	1	.....
	Peru Township	1	.....
	Cass Township	8	.....
Muskingum	Dresden	5	.....
	Falls Township	2	.....
	Highland Township	2	.....

CASES AND DEATHS OF SMALLPOX REPORTED, ETC.—Continued.

County.	Place.	Cases.	Deaths.
Muskingum—Con...	Licking Township	1	.....
	Madison Township	1	.....
	New Concord	14	.....
	Newton Township	8	.....
	Perry Township	6	.....
	Richhill Township	1	.....
	South Zanesville	1	.....
	Springfield Township	42	.....
	Union Township	12	.....
	Washington Township	30	.....
	Wayne Township	2	.....
	Zanesville	72	.....
Noble	Jefferson Township	1	.....
	Middle Creek	1	.....
Ottawa	Allen Township	15	.....
	Bay Township	1	.....
	Oak Harbor	21	.....
	Portage Township	17	.....
	Port Clinton	9	.....
Paulding	Salem Township	14	.....
	Blue Creek Township	4	.....
	Emerald Township	3	.....
	Jackson Township	11	.....
	Paulding Township	1	.....
Perry	Corning	1	.....
	Hopewell Township	50	.....
	Junction City	1	.....
	Monroe Township	5	.....
	Pleasant Township	1	.....
	Reading Township	1	.....
	Thorn Township	1	.....
Pickaway	Circleville	10	.....
	Circleville Township	6	.....
	Pickaway Township	2	.....
	Commercial Point	5	.....
	Scioto Township	5	.....
	Walnut Township	3	.....
Pike	Camp Creek Township	16	3
	Mifflin Township	4	.....
	Scioto Township	15	.....
	Sunfish Township	1	.....
	Edinburgh Township	1	.....
Portage	Charleston Township	5	.....
	Garrettsville	1	.....
	Hiram	6	1
	Kent	5	.....
	Paris Township	1	.....
Preble	Ravenna	1	.....
	Camden	1	.....
	Eaton	1	.....
	Harrison Township	15	.....
Putnam	Twin Township	33	.....
	Columbus Grove	19	.....
	Continental	10	.....
	Fort Jennings	2	.....
	Jennings Township	7	.....
	Miller City	1	.....
	Monroe Township	20	.....
	Palmer Township	17	.....
	Perry Township	2	.....
	Sugar Creek Township	24	.....
	Union Township	2	.....
Richland	Madison Township	9	.....
	Mansfield	22	2
	Shelby	1	.....
	Weller Township	1	.....

CASES AND DEATHS OF SMALLPOX REPORTED, ETC.—Continued.

County.	Place.	Cases.	Deaths.
Ross	Chillicothe	26	.....
	Colerain Township	1	.....
	Deerfield Township	1	.....
	Frankfort	1	.....
	Green Township	1	.....
	Huntington Township	6	.....
	Liberty Township	1	.....
	Scioto Township	11	.....
Sandusky	Clyde	1	.....
	Fremont	1	.....
	Gibsonburg	1	.....
	Madison Township	4	.....
	Scott Township	3	.....
	Washington Township	1	.....
Scioto	Bloom Township	9	2
	Clay Township	50	3
	Green Township	14	.....
	Jefferson Township	1	.....
	Morgan Township	3	.....
	Porter Township	4	.....
	Portsmouth	46	8
	Valley Township	1	.....
Seneca	Big Spring Township	1	.....
	Clinton Township	4	.....
	Eden Township	9	.....
	Fostoria	2	.....
	Hopewell Township	1	.....
	Tiffin	11	.....
Stark	Alliance	28	.....
	Canton	84	.....
	Canton Township	11	.....
	Jackson Township	8	.....
	Lexington Township	14	.....
	Louisville	8	.....
	Massillon	78	.....
	Nimishillen Township	3	.....
	Perry Township	9	.....
	Plain Township	1	.....
	Sugar Creek Township	5	1
Summit	Tuscarawas Township	25	.....
	Akron	78	2
	Barberton	52	1
	Copley Township	4	.....
	Coventry Township	1	.....
	Cuyahoga Falls	4	.....
	Franklin Township	4	.....
	Mogadore	1	.....
	Springfield Township	2	.....
	Tallmadge Township	5	.....
	Bazetta Township	4	.....
Trumbull	Brookfield Township	7	1
	Champion Township	28	.....
	Cortland	1	.....
	Girard	2	.....
	Girard Township	2	.....
	Hubbard	1	.....
	Hubbard Township	7	.....
	Southington Township	1	.....
	Warren	8	.....
	Canal Dover	11	1
	Dennison	17	2
Tuscarawas	Lawrence Township	1	.....
	Mill Township	1	.....

CASES AND DEATHS OF SMALLPOX REPORTED, ETC.—Concluded.

County.	Place.	Cases.	Deaths.
Tuscarawas—Con...	Mineral City	2	.....
	New Philadelphia	2	.....
	Rush Township	1	.....
	Uhrichsville	19	.....
Union	Dover Township	2	.....
	Jackson Township	15	.....
	Leesburg Township	33	.....
	Taylor Township	8	.....
	Washington Township	2	.....
	York Township	4	.....
Var. Wert	Harrison Township	17	.....
	Hoaglin Township	3	.....
	Jennings Township	9	.....
	Ridge Township	2	.....
	Van Wert	2	.....
	Willshire	6	.....
Vinton	York Township	5	.....
	Harrison Township	10	.....
	Vinton Township	6	2
Warren	Deerfield Township	2	.....
	Franklin Township	1	.....
	Mason	15	.....
	South Lebanon	6	.....
Washington	Barlow Township	1	.....
	Belpre	2	.....
	Belpre Township	32	1
	Dunham Township	39	.....
	Grandview Township	1	.....
	Marietta	53	9
	Marietta Township	6	.....
	New Matamoras	11	1
	Warren Township	6	.....
	Chippewa Township	1	.....
Wayne	Green Township	2	.....
	Smithville	2	.....
	Bryan	4	.....
	Center Township	20	.....
	Edgerton	7	.....
Williams	Millcreek Township	4	.....
	Northwest Township	10	.....
	Springfield Township	20	.....
	Superior Township	11	.....
	Bloom Township	3	1
	Bowling Green	6	.....
	Center Township	2	.....
	Freedom Township	2	.....
	Henry Township	11	.....
	Middleton Township	36	.....
	Montgomery Township	7	.....
	Perry Township	15	.....
	Perrysburg	2	.....
	Perrysburg Township	5	.....
	Plain Township	1	.....
Wood	Portage Township	5	.....
	Rising Sun	10	.....
	Troy Township	4	.....
	West Millgrove	15	.....
	Carey	5	.....
	Crawford Township	2	.....
	Ridge Township	16	.....
	Salem Township	1	.....
	Sycamore Township	1	.....
	Upper Sandusky	1	.....
Wyandot	Crawford Township	2	.....
	Ridge Township	16	.....
Total	87 Counties.	553 Places	6,903
			287

PUBLIC WATER SUPPLIES.

Under the provision of an act requiring plans for public water supplies and sewerage systems to be approved by the State Board of Health the following places have presented plans to the Board for either a new system of water works or for the extension or improvement of a water supply already in use: .

Bainbridge, Barberton, Brookville, Cadiz, Elyria, Findlay, Jacksonville, Johnstown, Leipsic, Milford, Murray, Oberlin, Ottawa, Salem, Scio, Springfield, Strasburg, Toledo, Vermilion and West Manchester.

Of these water works plants fifteen were new installments. All were approved.

SEWERAGE AND SEWAGE DISPOSAL.

Plans for a new sewerage system, or for the extension of an existing system, were presented by the following places:

Bond Hill, Cincinnati, Cuyahoga Falls, Delphos, the Fairmount Children's Home, Fayette, Girard, Kenton, Montpelier, Mt. Gilead, Mt. Vernon, Newcomerstown, Perrysburg, St. Bernard, St. Marys, Scio, Springfield, Toledo, Toledo Detention Hospital, Troy, Wadsworth, Warren, Winton Place and Youngstown.

The plans for additional sewerage for Kenton and for Mt. Vernon were disapproved because the streams at both places are already so overburdened with sewage as to cause objectionable pollution during dry seasons.

The plans for sewers for Perrysburg were disapproved, unless purification works should be constructed, because the water supply of Toledo is taken from the Maumee River only a few miles below where it was proposed to discharge the unpurified sewage of that village.

Plans for additional sewerage for Springfield were disapproved in part.

Plans for sewage disposal works were approved for Delphos, Girard, Mt. Gilead, Newcomerstown, St. Marys, Wadsworth, the Fairmount Children's Home, near Alliance, and for the Detention Hospital at Toledo.

THE TYPHOID FEVER EPIDEMIC AT CLEVELAND.

Until a few months ago Cleveland derived its water supply from Lake Erie at a point one and one-third miles from the shore, and a little to the west of the mouth of the Cuyahoga River. The supply was constantly subjected to sewage pollution, even as far back as 1886, when attention was called to it by the health officer of the city. During all these years, Cleveland has suffered more or less from typhoid fever, in large part due, it is believed, to the polluted public water supply.

The following table shows the yearly deaths from typhoid since 1887:

1888	1889	1890	1891	1892	1893	1894	1895	1896	1897	1898	1899	1900	1901	1902	1903
114	185	180	155	166	153	89	117	143	73	121	118	205	140	133	472

The epidemic of 1903 began in January, reached its height the latter part of March, and gradually declined during April, May and June. For the year there were 3,358 cases and 472 deaths reported to the State Board of Health.

A special report of this epidemic, made by a committee of the Board, will be found on subsequent pages.

SPECIAL STUDY OF PUBLIC WATER SUPPLIES.

A special study of the water supplies of the following cities was made during the year: Alliance, Bellaire, Defiance, Fremont, Port Clinton, Sandusky, Tiffin and Zanesville. The water supply of the village of Mingo Junction was also studied.

None of these cities can be said to have at all times a safe water supply. A full report of the examinations made of the water supplies of these cities will be found in the report of work done in the laboratory.

There has now been collected from all over the world the most convincing evidence that a community making use of a sewage polluted water supply suffers constantly from a comparatively high typhoid fever death rate, with the chance of having at more or less frequent intervals an epidemic of the disease. So long as the people are content to put up with polluted water supplies we must expect typhoid fever to play a very considerable part in our urban mortality rates. It may be noted with some satisfaction, however, that there is a growing sentiment in favor of filtration of water supplies.

Cincinnati, as noted in a former report, is building filtration works. Columbus will vote on the issue of bonds at the next election to build a filtration plant. Toledo has had a report from an expert engineering commission upon a new water supply in which filtration works form a part of the plan. Cleveland has found that her supply has not been greatly improved by opening up the new intake tunnel, and there has been considerable public discussion in favor of filters. Youngstown, where typhoid fever has been a terrible scourge, has voted to put in filters. Elyria, using Lake Erie water, has just started a new filtration plant.

All this is very encouraging, and we may look for great improvements in our public water supplies in the near future.

VILLAGE HEALTH OFFICERS.

The last General Assembly provided in the Municipal Code that villages (all municipalities of less than 5,000 inhabitants) should be authorized to appoint a health officer in lieu of a board of health. Such health officers must be approved by the State Board of Health. One hundred and eighty-five villages have taken advantage of this privilege and appointed health officers.

It is yet too soon to state positively whether this plan will secure better service than the old board of health plan.

The health officer appointed in lieu of a board of health is authorized to make and enforce such rules and regulations as he may deem necessary. Those of a general nature must be approved by the State Board of Health.

To secure uniformity in sanitary regulations in villages, and as a help and guide to health officers, the following instructions and orders, and regulations were adopted by the board and copies furnished to all health officers:

INSTRUCTIONS TO THE

HEALTH OFFICER APPOINTED IN LIEU OF A BOARD OF HEALTH.

Any village may appoint a health officer in lieu of a board of health. If a board of health has already been established, it is necessary to repeal the ordinance creating such board and to provide by a new ordinance for a health officer.

The council should appoint the health officer, fix his salary and term of office. The appointee must be approved by the State Board of Health. Upon receipt of a notice of such appointment a proper blank will be sent for a certificate by the village clerk of the action of council, and when this is returned due notice will be forwarded of the approval or disapproval of such appointee by the State Board of Health.

Section 187 of the Municipal Code provides that a health officer so appointed "shall have all the powers and perform all the duties granted to or imposed upon boards of health, except that all rules, regulations or orders of a general character and required to be published, made by such health officer, shall be approved by the State Board of Health."

Section 2116 of the Revised Statutes requires the health officer to procure suitable books and blanks for the transaction of the business of his office, and he is directed to keep a book for the registration of deaths and cases of infectious and contagious diseases.

NUISANCES.

The health officer should give attention to the prevention and abatement of nuisances. In the way of prevention will be the enforcement of standing orders or regulations governing privy vaults, cess-pools, hog pens, slaughter houses, stables, etc., including the proper disposal of garbage.

These regulations will be referred to further on.

INFECTIOUS AND CONTAGIOUS DISEASES.

The most important duty of the health officer is to prevent the introduction and spread of infectious and contagious diseases. The statutes fully define the duties of the health officer in reference to this matter, but he should enforce certain additional measures, to be provided for by standing orders or regulations, to which reference will be made further on.

The health officer should strictly require the attending physician to promptly report to him cases of dangerous contagious or infectious diseases. He should at once quarantine the patient and others exposed, and placard the house. He should see to it that the quarantine is strictly maintained as long as there is danger of the disease being communicated; and he should personally look after the disinfection of the house and contents.

MISCELLANEOUS DUTIES.

The health officer is required to inspect school houses semi-annually. The condition of privies or water-closets; the purity of the drinking water; the general condition as to cleanliness of the school rooms; defects in heating and ventilation, and all other matters bearing upon the health of the school children should receive his attention. He should abate all nuisances found upon school property. The health officer should make frequent inspections of the streets, alleys and yards, and prevent the throwing or accumulation of filthy, putrescible matters in such places.

When a death occurs in the village the body must not be moved, for burial or transportation, without a permit from the health officer. Before granting this permit the undertaker or other person in charge of the corpse, should be required to fill out a proper blank, giving all the facts necessary to preserve concerning the decedent, including the cause of death as certified to by the attending physician. A full record of the death should be entered in a book kept for that purpose.

The health officer must make a weekly report to the State Board of Health of all cases of contagious or infectious diseases reported to him; and also a monthly report of all deaths. Blanks will be furnished by the State Board of Health for such reports. He must also make report on or before the 15th of January each year to his council and to the State Board of Health, and furnish the latter with such special reports as may be required.

As previously stated, the health officer is authorized to adopt orders and regulations. When these are of a temporary character and of special, not general, application, they do not have to be approved by the State Board of Health, nor is their publication necessary. A permanent record of such an order should be made, however, to be produced in court if prosecution should be necessary to enforce it.

The standing orders and regulations should fully cover matters of common occurrence, such as the usual nuisances—privies, pig-pens, manure heaps, etc., and the essential measures for the control of communicable diseases. These orders, being of a general nature, applying equally to all citizens, are in fact laws, having all the force and effect of ordinances. They must be certified, recorded and published the same as ordinances. They must also be approved by the State Board of Health.

To assist the health officer the following orders and regulations have been prepared by the State Board of Health. As villages now include all municipalities of less than 5,000 population, some changes in, additions to, or subtractions from the rules and regulations here recommended, may be found ad-

visable. Whether adopted as they stand or changed, they must be sent to the State Board of Health for approval.

The State Board of Health has prepared and issues for gratuitous distribution the following pamphlets:

Rules and Regulations of the Ohio State Board of Health.

Laws of Ohio relating to the Powers and Duties of Boards of Health.

Rules and Regulations of the Ohio State Board of Health for the Prevention of Smallpox.

Smallpox: Its Restriction and Prevention.

Prevention of Smallpox: A Circular of Information for Local Health Authorities.

The Diagnosis of Smallpox.

Diphtheria and Membranous Croup: Recommendations for their Prevention and Restriction.

Scarlet Fever: Its Restriction and Prevention.

Typhoid Fever: Its Prevention and Restriction.

Disinfection and Disinfectants.

The Prevention of Consumption.

The Care and Management of Infants and Young Children.

Information concerning the use of the Laboratory of the Ohio State Board of Health.

The Board will at all times be ready to furnish the health officer any assistance in its power.

Respectfully,

[Signed] C. O. PROBST, M. D.

Secretary.

By order of the Board.

ORDERS AND REGULATIONS RECOMMENDED TO THE HEALTH OFFICER BY THE OHIO STATE BOARD OF HEALTH.

Be it ordered by the Health Officer of the village of..... Ohio, that the following orders and regulations for the protection of the public health, for the prevention and restriction of contagious and infectious diseases and for the suppression and abatement of nuisances, which the health officer deems necessary therefor, be and the same are hereby made and adopted by said health officer.

CONTAGIOUS AND INFECTIOUS DISEASES.

SECTION 1. No person shall introduce or aid or assist in introducing into the village the smallpox, cholera, bubonic plague, yellow fever, diphtheria, scarlet fever, or any other dangerous contagious or infectious disease.

SEC. 2. No person having smallpox, diphtheria, scarlet fever, or any other dangerous contagious or infectious disease shall appear or be in any public street, place or building, or in any place or building used for public worship, meetings or amusements, or in any store, shop, office or place of business, or in any public car, hack, stage, omnibus, or other vehicle or conveyance within said village, or in any other place in said village than where he resides or has lodging, or to which he may be ordered to be restrained as hereinafter provided.

SEC. 3. It shall be the duty of every physician called to attend a person within the village of....., who has smallpox, diphtheria,

membranous croup, scarlet fever, cholera, bubonic plague, yellow fever, typhus fever, measles, whooping cough or chickenpox, to report the same within twelve (12) hours thereafter to the health officer of said village, giving in such report the name, age, sex and color of the patient, and the house or place in which such persons reside or may be found.

SEC. 4. Upon the receipt of such a report the health officer will at once place or cause to be placed in a conspicuous place upon said house or structure wherein exists any of the diseases mentioned in the preceding section, a card having printed upon it in letters not less than two inches high the name of the disease within, and in addition, except in whooping-cough, chickenpox and measles, the following notice, to-wit: "Warning! This house is quarantined on account of *Contagious Disease* within. No person shall enter or leave such house without the written permission of the village health officer. And no person shall destroy, displace, deface or cover up said card, nor shall it be removed except by the health officer or upon his written order."

SEC. 5. The quarantine of said house shall be maintained, and the card before mentioned shall remain in place until the patient has been removed from such house, or has recovered and is no longer capable of communicating the disease and the said house has been properly purified and disinfected by the health officer; and where other inmates of said house have been exposed to and are liable to become ill of any of the following diseases, the quarantine shall be maintained and the card shall remain in place for an additional period, counting from the completion of disinfection, as follows, to-wit: In diphtheria and membranous croup fourteen (14) days; in smallpox seventeen (17) days; in scarlet fever ten (10) days; in cholera or yellow fever seven (7) days, and in typhus fever twenty-one (21) days.

SEC. 6. The health officer will at once notify the superintendent of any public, private or parochial school, or Sunday school of the location of any house and the name of the person quarantined therein, as provided in the above section; and it shall be the duty of such superintendent, and of other persons in charge of such schools, to exclude therefrom all persons residing in or in such house until such time as they shall present a written permit from the health officer to attend or re-enter such schools.

SEC. 7. No person shall give, lend, sell, transmit, or expose, without previous disinfection by the health officer, any bedding, clothing, rags or other thing which contains or has been exposed to the infection of smallpox, diphtheria, scarlet fever, or any other dangerous contagious or infectious disease; or shall knowingly let for hire any house, room or part of a house in which any person has been ill or has died of any such disease, prior to such house, room or part of a house having been disinfected by the health officer.

SEC. 8. The bodies of persons who have died of smallpox, cholera, bubonic plague, yellow fever, typhus fever, diphtheria, membranous croup, scarlet fever, or other dangerous contagious or infectious disease, shall be buried or cremated within twenty-four (24) hours after death except by written permission of the health officer; and no public or church funeral shall be held in connection with the burial or cremation of a person who has died of any of the above named diseases, and the body of such person shall not be taken into any church, chapel or other public place, and only the adult members of the family and such other adult persons as are actually necessary shall be present at the burial or cremation of such body.

SEC. 9. No corpse shall be removed for burial or cremation without a permit from the health officer; and before such permit is granted, the under-

taker, sexton or other person in charge shall deposit with the health officer a certificate, setting forth such facts concerning the decedent as may be required, including a certificate of the cause of death, signed by the physician who last attended the deceased. When a coroner's inquest has been held, the coroner shall certify to such facts; and in case where no physician has been in attendance, the certificate shall be given by some relative or attendant of the deceased. It shall be the duty of physicians, on application of an undertaker or other person in charge of a burial, to furnish a certificate in writing of the name, residence, date and cause of death of all persons professionally attended by them during a last illness.

NUISANCES.

SEC. 10. No owner, agent, assignee, occupant or tenant of any lot, property, building or structure, shall cause, allow, permit or suffer, any water-closet, privy, privy vault, cess-pool, receptacle for slops, sink, drain, sewer, sewer trap or connection, water or soil pipes, cellar, barn, stable, stable yard, hog pen, hog-yard, poultry roost, poultry coop, or any other building, structure, place or thing in or upon any premises owned, controlled or occupied by such person, to become, be or remain foul, noisome or offensive; and no such person shall cause, allow, permit or suffer any deposit or accumulation on any premises owned, controlled or occupied by him of any filth, offal, garbage, slops or other decaying animal or vegetable matter.

SEC. 11. No person shall use any well as a receptacle for night soil, house slops or other filthy substance, and all abandoned wells shall be filled to the surface with rock, gravel, sand or clean earth.

SEC. 12. No privy shall hereafter be constructed without a permit from the health officer. Such privy shall conform to one of three arrangements—a crock or earthen vessel, a water-tight vault, or a dry earth closet—and no privy vault shall be located within fifty (50) feet of any well.

SEC. 13. No privy vault shall be allowed to become filled within two (2) feet of the surrounding ground surface. All privies, privy vaults, dry earth closets and cess-pools shall be emptied and cleaned whenever deemed necessary by the health officer, and no privy, privy vault, closet or cess-pools shall be permitted to become or remain foul, noisome or offensive.

SEC. 14. Privies, privy vaults and cess-pools, shall be cleaned at such hours and in such manner as may be prescribed by the health officer, and the contents thereof shall not be placed or buried within the limits of the village without the permission of the health officer.

SEC. 15. From every livery stable, and from all private premises within one hundred (100) feet of any dwelling house, where more than two animals of the horse, mule or cattle kind are kept, the manure shall be removed at least twice each year, and as much oftener as the health officer may deem necessary, and in no case shall manure be allowed to accumulate until it becomes a nuisance.

SEC. 16. No live hog or hogs shall be kept within the village more than twenty-four (24) hours between the months of April and November. No slaughter house shall be permitted to be or to remain within the village, and no fertilizer shall be stored within the village except by permission of the health officer.

SEC. 17. Upon the death of any animal within the village, except when the same is killed for food, the owner or persons having control thereof shall immediately remove the same to such place either within or without the village as the health officer may direct, and there properly bury or burn the same.

FOOD.

SEC. 18. No person shall bring into this village, or sell, or offer for sale, any cattle, sheep, hog, or lamb, nor any meat, fish, game, or poultry, nor any vegetables, fruits, or other articles of food that are diseased, unsound, unwholesome, or that for any reason are judged by the health officer to be unfit for human food.

SEC. 19. No person shall sell or have for sale any unwholesome, impure, diluted or adulterated milk, or milk from diseased cows, or from cows fed on garbage, or decomposing or unhealthy food of any character, nor cheese or butter made from such milk; and no person shall sell any milk which has been skimmed in whole or in part, unless at the time he sells such milk he truly informs the purchaser of the fact of such skimming; and the sale of milk without a written permit from the health officer, after any contagious or infectious disease occurs in the family or among the employes of the dairyman, or others engaged in handling the milk, is prohibited.

PENALTY.

SEC. 2119. Whoever violates any provision of this chapter, or any order or regulation of the board of health made in pursuance thereof, or obstructs or interferes with the execution of any such order, or wilfully or illegally omits to obey any such order, shall be fined in any sum not exceeding one hundred dollars or imprisoned for any time not exceeding ninety days, or both; but no person shall be imprisoned under this section for the first offense, and the prosecution shall always be as and for a first offense, unless the affidavit upon which the prosecution is instituted contains the allegation that the offense is a second or repeated offense. (O. L., v. 95, p. 424.)

These orders and regulations shall take effect and be in force from and after their legal publication.

Adopted....., 190..

.....
Health Officer.

Of the village of.....

These regulations, with slight changes in a few instances, have been adopted in the following villages:

Ansonia, Beaver, Beloit, Berlin Heights, Blanchester, Bloomingburg, Bowersville, Butler, Carey, Columbus Grove, Creston, Cumberland, Cushtar, Dexter City, East Springfield, Freeport, Grand Rapids, Lexington, Lisbon, Lockland, Minerva, Mt. Sterling, New Lebanon, Ottoville Plainfield, Pleasant Ridge, Racine, Roseville, Somerville, Sugar Grove, Sylvania, Uniopolis, Vandalia, West Alexandria, West Liberty, Winchester, and Winton Place.

SEWAGE PURIFICATION WORKS.

A special report upon the sewage purification works in Ohio will be found on subsequent pages. An attempt was made, with but partial suc-

cess, to give for each plant a description of construction with cost of construction and cost of operation, and results obtained. The analytical data are too meager for positive conclusions, but will indicate in some degree the amount of purification effected at the various plants. Too much emphasis cannot be given to the fact that sewage purification works must have constant, intelligent supervision to produce good results. The lack of this is the cause for the failure of several of our Ohio plants.

The Board will continue its inspection of these purification plants and hopes thereby to stimulate the local authorities into giving them better care.

Reports of the various investigations of the Board, mortality statistics, the work of the laboratory, etc., will be found under appropriate headings.

MINUTES OF BOARD MEETINGS.

SECRETARY'S QUARTERLY REPORTS.

JANUARY MEETING.

The regular meeting of the State Board of Health was held at the office of the Board in Columbus on January 28th, 1903.

The meeting was called to order by the president at 8 P. M.

All members were present except Dr. Miller.

On motion of Dr. Stanton it was voted to defer the reading of the minutes until after certain visitors present could be heard.

Mr. Thomas R. Cook, superintendent of the water works of Toledo, and Mr. William G. Clark, a member of the engineering commission appointed to report upon an improved water supply for that city, presented plans and specifications for a new water supply for Toledo.

Mr. A. R. Dow, superintendent of the water works of Salem, asked the Board to approve plans which he presented for an additional water supply for that city.

Dr. W. W. Brand, health officer of Toledo, presented plans, which he asked the Board to approve, for a sewage disposal plant for the small-pox hospital of the city of Toledo; these plans to be substituted for plans for a similar plant already acted upon by the Board.

These various matters, upon motion of Dr. Warner, were referred to executive session.

The minutes of the last meeting were then read and approved.

The secretary presented his quarterly report, which was approved and ordered filed for publication.

Dr. Stanton reported that the health officer of Cincinnati had succeeded in getting practically all the children vaccinated who were attending the public schools; that he was meeting with some difficulty in securing vaccination of the children attending parochial schools, and that he had asked for some support in this matter from the State Board of Health. This brought up the question of vaccination of school children. The secretary reported that he had been having a good deal of correspondence in reference to so-called "internal vaccination," by which was meant the administering of some drug or internal remedy as protection against smallpox and to take the place of vaccination. The question had been raised in several communities as to whether boards of education should accept a certificate that a child had received such treatment, where certificates of successful vaccination were required.

On motion of Dr. Chapman, the secretary was instructed to prepare a resolution relative to the prevalence of smallpox in Ohio, the need for vaccination of school children, and to include a definition of vaccination. The secretary presented the following resolution, which was adopted:

WHEREAS smallpox is now prevailing to an unusual extent in Ohio and other states, and

WHEREAS recent successful vaccination is a certain, and the only known means for its prevention,

Be it resolved: That boards of health and boards of education be urged to require that all children attending school shall be successfully vaccinated.

Be it further resolved: That this Board condemns the so-called "interan vaccination," believing it to be non-protective against smallpox, and adopts the following definition of vaccination, which was adopted at the Conference of State and Provincial Boards of Health of North America, held in New Haven, Conn., October 28th and 29th, 1902, to wit: "An inoculation by scarification, puncture or injection beneath the epidermis of a vaccine which produces, with some constitutional disturbance, the typical vaccine vesicle, which leaves, after the pock has healed, its characteristic scar."

The actions of the Board in regard to sewerage, sewage disposal or water supplies by mail vote, since the last meeting, were taken up for confirmation.

It was moved by Dr. Warner and seconded by Dr. Palmer that the outlet of a sewer at Maumee be approved provided the Lucas County Commissioners give the Board written assurance that no drainage shall be permitted to enter the sewer and that it be used exclusively for cellar drainage and surface water. (Received. Secretary.)

Those voting in the affirmative were Messrs. Crossland, Stanton, Hartzell, Palmer, Warner and Chapman.

In the negative, none.

It was moved by Dr. Stanton and seconded by Dr. Chapman that the plans for a sewerage system for St. Marys be approved upon the condition that plans for purification of the sewage be presented with sewerage plans, said purification works to be built at the time the sewers are being constructed.

Those voting in the affirmative were Messrs. Crossland, Stanton, Hartzell, Palmer, Warner and Chapman.

In the negative, none.

It was moved by Dr. Chapman and seconded by Mr. Hartzell, that permission be given to the directors of the Washington County Infirmary to first build and operate a septic tank to determine whether this alone will abate the nuisance caused by the sewage from the Infirmary, in accordance with plans designed by Mr. T. M. Riley, C. E.

Those voting in the affirmative were Messrs. Crossland, Stanton, Hartzell, Palmer, and Chapman.

In the negative, Dr. Warner.

It was moved by Mr. Hartzell and seconded by Dr. Stanton that the plans for a system of sewers in the business district of Loudonville, with outlet into Black Fork Creek, be approved with the understanding that purification works be installed if a nuisance occurs, or when deemed necessary by the State Board of Health.

Those voting in the affirmative were Messrs. Crossland, Stanton, Hartzell, Palmer, Warner, and Chapman.

In the negative, none.

It was moved by Dr. Palmer and seconded by Dr. Chapman that a water supply for New Bremen, to be obtained from a number of drilled wells in the southeastern part of the corporation at the foot of Herman Street, be approved.

Those voting in the affirmative were Messrs. Crossland, Stanton, Hartzell, Palmer, Warner and Chapman.

In the negative, none.

It was moved by Mr. Hartzell and seconded by Dr. Warner that a water supply for Sebring, to be obtained from the Mahoning River at a point two and one-half miles south of the village, be approved.

Those voting in the affirmative were Messrs. Crossland, Stanton, Hartzell, Palmer, Warner, and Chapman.

In the negative, none.

It was moved by Mr. Hartzell and seconded by Dr. Stanton that a water supply for Wilmington, to be obtained from drilled wells in the northeast corner of the village at the intersection of Columbus Street and the C. & M. V. Railway, be approved upon the condition that all surface water be effectually excluded from the wells.

Those voting in the affirmative were Messrs. Crossland, Stanton, Hartzell, Palmer, Warner, and Chapman.

In the negative, none.

It was moved by Dr. Stanton and seconded by Mr. Hartzell that a water supply for Freeport be approved, but, as there was uncertainty as to the yield of the wells (north of the city), that the Board advise the authorities to endeavor to find another supply which would be entirely satisfactory as regards both quality and quantity.

Those voting in the affirmative were Messrs. Crossland, Stanton, Hartzell, Palmer, Warner, and Chapman.

In the negative, none.

Dr. Chapman presented a report upon sewerage proposed for District No. 37 of the city of Toledo, and moved that the plans, providing for an outlet into the Maumee River at the foot of Columbus Street, be approved. This was seconded by Dr. Warner.

Those voting in the affirmative were Messrs. Crossland, Stanton, Hartzell, Palmer, Warner, and Chapman.

In the negative, none.

Dr. Warner reported that the committee appointed to consider the matter of an investigation of the sanitary condition of the Ohio Penitentiary had laid the matter before the Governor and received his approval for the investigation; that the committee visited the penitentiary and consulted Warden Darby, who was very anxious that the investigation should be made and promised every assistance possible.

On motion of Dr. Chapman it was voted to receive the report and continue the committee with instructions to complete the investigation.

It was moved by Dr. Warner and seconded by Dr. Stanton that the plans for improving the public water supply of the city of Toledo, to-wit: to take the water from the main channel in the Maumee River about opposite the house of the Country Club and to install necessary purification works for the filtration of said supply, be approved with the provision that completed plans for the purification of said supply shall be submitted to the State Board of Health for approval, and that the water shall be filtered in a manner satisfactory to that Board.

Those voting in the affirmative were Messrs. Crossland, Stanton, Hartzell, Palmer, Warner, and Chapman.

In the negative, none.

It was moved by Dr. Stanton and seconded by Dr. Chapman that the water supply for Salem, to be obtained from drilled wells located about one-half mile southwest of the city, be approved.

Those voting in the affirmative were Messrs. Crossland, Stanton, Hartzell, Palmer, Warner, and Chapman.

In the negative, none.

It was moved by Dr. Chapman and seconded by Dr. Stanton that the plans for sewage disposal for the smallpox hospital, for the city of Toledo, as presented by Dr. W. W. Brand, health officer, be approved.

Those voting in the affirmative were Messrs. Crossland, Stanton, Hartzell, Palmer, Warner, and Chapman.

In the negative, none.

It was moved by Dr. Warner, and seconded by Dr. Palmer, that a water supply for the city of Findlay, to be obtained from springs on the Hays and Smith farms and wells on the King and Kurtz farms, located in Section 34 of Big Lick Township, Hancock County, be approved.

Those voting in the affirmative were Messrs. Crossland, Stanton, Hartzell, Palmer, Warner, and Chapman.

In the negative, none.

Dr. Stanton presented a report upon sewerage for that part of Division No. 12, of the city of Cincinnati, included in Corbin, Brown, Watson, Humbert and other streets, avenues and rights of way.

It was moved by Dr. Chapman, and seconded by Dr. Stanton, that the plans for these sewers be approved upon the condition that no connection for house drainage, water closets or vaults shall be permitted without the consent of the State Board of Health, and that said approval shall take effect upon the receipt by the State Board of Health of a written agreement of the board of public service that no permit shall be granted for house connections contrary to said conditions. (Not received. Secretary.)

Those voting in the affirmative were Messrs. Crossland, Stanton, Hartzell, Palmer, Warner, and Chapman.

In the negative, none.

Plans for sewerage for the city of Troy, prepared by Mr. John P. Force, C. E., were presented. On motion of Dr. Warner, Dr. Stanton was appointed a committee to visit Troy and investigate and report upon the proposed outlet.

On motion of Dr. Chapman, and seconded by Dr. Warner, the plans for a sewerage system and purification works for the village of St. Marys, as prepared by Mr. John P. Force, C. E., were approved.

Those voting in the affirmative were Messrs. Crossland, Stanton, Hartzell, Palmer, Warner, and Chapman.

In the negative, none.

On motion of Dr. Chapman, and seconded by Dr. Stanton, the plans for a sanitary sewer system and purification works for the village of Mt. Gilead, as presented by Mr. J. B. Weddell, engineer, were approved.

Those voting in the affirmative were Messrs. Crossland, Stanton, Hartzell, Palmer, Warner, and Chapman.

In the negative, none.

Dr. Stanton presented a report of his investigation of the condition of Mill Creek, which was made with the assistance of the engineer, Mr. Flynn.

On motion of Dr. Chapman, the report was approved and the secretary was instructed to call the attention of the legislature to the need for mandatory legislation to abate this nuisance. The motion was seconded by Dr. Palmer.

Those voting in the affirmative were Messrs. Crossland, Stanton, Hartzell, Palmer, Warner, and Chapman.

In the negative, none.

The secretary presented a report of a series of tests that had been made in the laboratory to show the disinfecting qualities of solidified formaldehyde as used in the lamp placed on the market by The Dr. George Leininger Chemical Company.

On motion of Dr. Warner, it was voted to publish this report in the *Ohio Sanitary Bulletin*.

The secretary reported that the committee appointed with power to act, to prepare a list of diseases considered as contagious or infectious

within the meaning of, and as required by the act establishing a State Board of Embalming Examiners, had selected the following list of diseases, to-wit: smallpox, chickenpox, diphtheria (membranous croup), scarlet fever, Asiatic cholera, bubonic plague, yellow fever, puerperal fever, erysipelas, and typhoid fever.

The question of changing the rules of the Board governing the transportation of dead bodies was discussed, but it was agreed to take no action until after the matter received further consideration by the Conference of State and Provincial Boards of Health of North America, which, at its last meeting, appointed a committee to take up this question.

The secretary suggested that it would be well for the Board to prepare a form to be given by local boards of health to embalmers who register their licenses with such boards, as required by law.

On motion of Dr. Chapman, the secretary was instructed to prepare such a form with an explanatory letter and send it to all local boards of health.

On motion of Dr. Warner, the secretary was authorized to employ a janitor for the laboratory.

The secretary presented a list of health officers who had been appointed in villages in lieu of a board of health.

On motion of Dr. Chapman these appointees were approved by the Board.

The secretary presented his annual report, which was approved and ordered submitted to the Governor for printing.

The secretary presented correspondence with Mr. W. A. King, Chief Statistician of the United States Census Office, at Washington, D. C., relative to registration of deaths in Ohio. Mr. King was of the opinion that under the present laws fairly good reports ought to be secured of deaths provided some central bureau would furnish to the various local boards of health all the necessary blanks and books for making and keeping reports. As there were no funds provided for such expenses, no action was taken in reference to the communication.

There being no further business the Board adjourned at the call of the president.

C. O. PROBST,
Secretary.

Attest:

QUARTERLY REPORT OF THE SECRETARY.

January, 1903.

Mr. President and Members of the Ohio State Board of Health:

Your secretary begs leave to respectfully submit the following report of operations of the Board since its last meeting, held in Cleveland October 15th, 1902.

The matter occupying most attention has been the continued prevalence of smallpox.

It will be recalled that the Cleveland epidemic of smallpox was at its height when the Board met there; further, that the health officer reported that he had and was still vigorously pushing vaccination, some 250,000 vaccinations having been performed by public vaccinators within a few weeks prior to that time.

Ironton, Columbus and Portsmouth are the only other places where smallpox has been present to an alarming degree.

, Ironton has reported 188 cases with one death since December 13th. Columbus now has 87 cases on hand.

Seventy-nine cases and 13 deaths were reported in Portsmouth since the outbreak of the disease, October 18th, 1902.

The following inspections of smallpox have been made by members of the Board or the secretary:

November 6th, Dr. Stanton visited Lockland.

November 7th, Dr. Chapman visited Pandora.

November 22nd, Dr. Stanton visited Paint Township, Clermont County.

November 28th, Dr. Stanton visited London.

November 29th, the secretary visited London.

November 22nd, Dr. Chapman visited Harris Township, Ottawa County.

November 30th, Dr. Stanton visited Reading.

December 1st, Dr. Stanton visited Reading.

December 17th, Dr. Chapman visited Tiffin.

December 17th, Dr. Chapman visited Eden Township, Seneca County.

December 18th, Dr. Chapman visited McClure.

December 18th, Dr. Chapman visited Damascus Township, Henry County.

December 20th, Dr. Chapman visited Bryan.

December 22nd, the secretary visited Delaware.

December 31st, Dr. Stanton visited Union Township, Brown County.

January 3d, Dr. Chapman visited Oregon Township, Lucas County.

January 6th, the secretary made an inspection in Columbus.

January 10th, Dr. Stanton visited Wayne Township, Adams County.

January 9th, Dr. Chapman visited Allen Township, Ottawa County.

January 20th, Dr. Stanton visited College Hill.

At Pandora the disease was pronounced itch, by Dr. Chapman, and Dr. Stanton pronounced the disease chickenpox at College Hill.

The medical inspectors have visited the following places to establish the diagnosis in suspected smallpox: Centerburg, Mt. Vernon, Columbus, Bennington Township, Licking County, Newton Falls, London, Leipsic, Bowersville, Steubenville, St. Paris, Cambridge, Spencer Township, Lucas County; Harrison Township, Licking County; Guyan Township, Gallia County; Mt. Victory, Amsterdam, Springfield, Spencerville, Jennings Township, Van Wert County; Amsterdam, Dennison, Lykens Township, Crawford County.

These visits were paid for by the local authorities except in four cases.

In four cases the disease was found to be chickenpox.

Dr. Marchand, of Canton, having resigned as medical inspector, Dr. D. F. Banker, of that place, upon the recommendation of Mr. Hartzell, was appointed to that position.

It would be a long chapter to give in detail the various actions that have been taken in prevention of smallpox. Unofficial reports of smallpox, of which there have been a number, have been promptly investigated, by telephone where possible. Telephone conferences with health officials have been extremely frequent, by night and day. In every new outbreak full instructions have been given for dealing with the disease. A number of conferences in regard to smallpox have been held at the office with health officials who have called for instructions. Vaccination has been encouraged in every way possible.

Records were secured of some nine or ten railway postal clerks who had contracted smallpox. In three instances they had continued their run when broken out with the disease. The attention of the Postmaster General was called to this, and he was urged to issue an order for the vaccination of traveling postal clerks. Such an order was finally given for this, the 5th, and for the 9th district.

On account of smallpox among railway employes, there having been no less than five Pullman porters on the Pennsylvania system taken with the disease, a letter was sent to the management of each railway in Ohio urging vaccination of their employes. This met with a hearty response, and in nearly all cases such an order was given.

A case of smallpox appearing among the students at the Ohio State University, with considerable exposure, I directed the president to require all unprotected students to be vaccinated. This was done.

An anti-vaccination society has been established in Columbus and a suit in mandamus has been brought to compel the board of education to admit an unvaccinated pupil.

In addition to the investigations of smallpox by the Board, the following have been made:

Diphtheria at McConnellsville, by Dr. Crossland.

Water supply for New Bremen, by Mr. Flynn.

Water supply for Loudonville, by Mr. Flynn.

Water supply for Wilmington, by Mr. Flynn.

Water supply for Sebring, by Mr. Hartzell.

Water supply for Findlay, by Mr. Flynn.

Sewers for St. Marys, by Dr. Warner.

Sewers at Maumee, by Dr. Chapman.

Sewerage for Perrysburg, by Dr. Chapman.

Sewage disposal for the Washington County Infirmary, by Mr. Flynn.

Sewage disposal at Fostoria, by Mr. Flynn.

Sewage disposal at Kenton, by Mr. Flynn.

Sewage disposal at East Cleveland, by Mr. Flynn.

Sewage disposal at Oberlin, by Mr. Flynn.

Sewage disposal at Mansfield, by Mr. Flynn.

Inspection of a schoolhouse at Newton Falls, by Mr. Flynn.

The pollution of Mill Creek, by Dr. Stanton and Mr. Flynn.

Of these reports those requiring further action will be brought up later, at the pleasure of the Board.

Upon investigation, Mr. Flynn found that the city of Columbus was simply extending the present sewer system on the West Side, and that no action by the Board was required.

Since the last meeting of the Board plans for sewerage, sewage disposal or water supply for a number of places have been acted upon by mail vote. The action of the Board should be confirmed by a *viva voce* vote.

The engineer, in connection with Mr. Leighton of the U. S. Geological Survey, has established stream gaging stations at the following places:

Old stations still maintained: Olentangy River at Columbus and Scioto River at Columbus.

New stations established November, 1902: Licking River at Pleasant Valley, Jonathan Creek at Powells, Ottawa River at Lima and Blanchard River at Ottawa.

Sites for new stations determined upon: Black River at Elyria, Cuyahoga River at Cleveland, Mahoning River at Youngstown. Cross Creek at Mingo Junction, McMahon Creek at Bellaire, Maumee River at Defiance, Tiffin River at Defiance and Auglaize River above Defiance.

Sites for new stations approximately determined upon: Mosquito or Meander creeks at Niles and Little Miami River at Morrow.

Respectfully submitted,

C. O. PROBST,

Secretary.

APRIL MEETING.

A regular meeting of the State Board of Health was held at the office of the Board in Columbus, on April 8th, 1903.

All members were present except Dr. Palmer.

The meeting was called to order by the president at 8 P. M.

The minutes of the last meeting were read and approved.

The secretary presented his quarterly report, which, on motion of Dr. Warner, was approved and ordered filed for publication.

The actions of the Board since the last meeting, in regard to sewerage and water supplies by mail vote, were taken up for confirmation.

It was moved by Dr. Stanton, and seconded by Dr. Miller, that the plans for sewerage for Perrysburg be disapproved, unless provision should be made for suitable purification works.

Those voting in the affirmative were Messrs. Crossland, Warner, Miller, Chapman, Hartzell, and Stanton.

In the negative, none.

It was moved by Dr. Chapman, and seconded by Mr. Hartzell, that the water-supply for the village of Scio, to be obtained from drilled wells, be approved.

Those voting in the affirmative were Messrs. Crossland, Miller, Warner, Chapman, Hartzell, and Stanton.

In the negative, none.

It was moved by Dr. Warner, and seconded by Mr. Hartzell, that the plans for sewerage for the city of Troy be approved.

Those voting in the affirmative were Messrs. Crossland, Miller, Warner, Chapman, Hartzell, and Stanton.

In the negative, none.

It was moved by Mr. Hartzell, and seconded by Dr. Stanton, that the Board approve a bond issue for \$6,500, by the city of Hamilton for sanitary purposes.

Those voting in the affirmative were Messrs. Crossland, Miller, Warner, Chapman, Hartzell, and Stanton.

In the negative, none.

The secretary presented a communication from Mr. F. D. Kishler, of Tiffin, Ohio, endorsed by the health officer, requesting permission to remove the body of his brother, Thomas Jefferson Kishler, to a more secure place in Greenlawn cemetery, Clinton Township, Seneca County, he having died of cholera in 1854. The body being buried on the bank of Rock Creek, it was represented that there was danger of its being washed into the creek during heavy rains.

It was moved by Dr. Miller, and seconded by Dr. Stanton, that the request be granted, the transportation to be made by private conveyance and the consent of the local health authorities to be obtained.

Those voting in the affirmative were Messrs. Crossland, Miller, Warner, Chapman, Hartzell, and Stanton.

In the negative, none.

The secretary presented a communication from Dr. J. M. Lindsley, President of the International Quarantine Bureau, at Nashville, Tennessee, asking the Board to endorse the regulations for the season of 1903, as laid down by the Public Health and Marine Hospital Service of the United States, giving open quarantine with Cuba.

On motion of Dr. Miller, it was voted that the Board considered it inexpedient to take any action upon the matter at this time.

The secretary presented a list of health officers appointed by council in lieu of a board of health, each having been recommended by five free-holders of their respective villages.

On motion of Dr. Stanton, and seconded by Dr. Chapman, these health officers were approved.

Plans were presented for a system of storm water sewers for District No. 1, of the village of Fayette, with an outlet into Turkey Foot Creek.

It was moved by Mr. Hartzell, and seconded by Dr. Chapman, that said plans be approved upon the condition that the sewers be used for storm water purposes only.

Those voting in the affirmative were Messrs. Crossland, Miller, Warner, Chapman, Hartzell, and Stanton.

In the negative, none.

Dr. Chapman presented a request from the waterworks trustees of Toledo, for the approval of plans to obtain a water supply for that city from the Miami and Erie Canal about opposite the Country Club instead of from the Maumee River, as already approved by the Board; should this, in the opinion of the trustees, be found advisable.

On motion of Dr. Miller, seconded by Dr. Warner, it was voted not to grant such permission.

Those voting in the affirmative were Messrs. Crossland, Miller, Warner, Hartzell and Stanton.

In the negative, Dr. Chapman.

Mr. Edwin R. Davis, of the firm of Davis & Humphry of Boston, Mass., presented plans for a separate system of sewers for the village of Newcomerstown.

Mr. E. G. Bradbury, of the firm of Snow & Barbour, of Boston, presented plans for a system of sewerage for the village of Girard.

Mr. Gessner, of the firm of Riggs & Sherman, of Toledo, presented plans for a system of sewers and sewage disposal works for the village of Delphos.

These questions were taken up in executive session.

It was moved by Dr. Stanton, and seconded by Dr. Chapman, that the plans for a separate system of sewers for Newcomerstown, as presented by Mr. Davis, be approved, but only upon the condition that the approval should not take effect until satisfactory plans for sewage purification works be submitted to and approved by the board.

Those voting in the affirmative were Messrs. Crossland, Miller, Warner, Chapman, Hartzell, and Stanton.

In the negative, none.

It was moved by Mr. Hartzell, and seconded by Dr. Miller, that the plans for a sewerage system for the village of Girard, presented by Mr. Bradbury, be approved, but only upon condition that sewage purification works be constructed at once.

Those voting in the affirmative were Messrs. Crossland, Miller, Warner, Chapman, Hartzell, and Stanton.

In the negative, none.

It was moved by Dr. Chapman, and seconded by Dr. Miller, that the plans for a system of sewers and sewage disposal works for the village of Delphos, as presented by Mr. Gessner, be approved.

Those voting in the affirmative were Messrs. Crossland, Miller, Warner, Chapman, Hartzell and Stanton.

In the negative, none.

Dr. Miller reported upon the epidemic of typhoid fever at Cleveland, and stated that he and Mr. Horton had made a partial investigation. He requested that a committee be sent there.

On motion of Dr. Chapman it was voted to appoint a committee to visit and report upon conditions at Cleveland in regard to their typhoid fever epidemic.

The president appointed as members of this committee, Drs. Miller and Chapman, and the engineer, when appointed, to be added to the committee.

There being no further business, the Board adjourned.

Attest:

C. O. PROBST,
Secretary.

QUARTERLY REPORT OF THE SECRETARY.

APRIL, 1903.

Mr. President and Members of the Ohio State Board of Health:

Your secretary respectfully presents the following report of work done since the last meeting, January 28, 1903.

The proceedings of the annual meeting with local boards of health were printed and distributed, 10,000 copies. Twenty-three hundred

and fifty copies of the 16th annual report of the Board were also distributed. A circular letter explaining the provisions of the Embalmers' Act, and suggesting a form for uniform registration of embalmers' licenses, was prepared and sent to each local board of health.

SMALLPOX.

Smallpox has continued to prevail somewhat extensively, though the disease has not assumed epidemic proportions except, possibly, in Columbus. From January 1st to April 5th, 1903, 2,493 cases and 129 deaths have been reported, a death rate of 5.2 per cent. Two hundred and eighty-five of these cases and 43 deaths were in Columbus. For the week ending April 4th, 1903, there were 96 cases of smallpox reported in 25 places, in 20 counties.

The following circular letter was sent to all large business concerns in the state whose addresses could be procured, except in the cities of Cleveland, Columbus and Toledo. The local health authorities in these three cities had already taken action to secure the vaccination of employees:

OHIO STATE BOARD OF HEALTH.

OFFICE OF THE SECRETARY.

COLUMBUS, OHIO, February 28, 1903.

DEAR SIR—The continued prevalence of smallpox in Ohio and throughout most of the United States and Canada, and above all its gradually increasing malignancy, is a cause for some alarm. More than 16,000 cases of smallpox have been reported to us in Ohio since the first outbreak in 1898. During the last eight weeks 1,363 cases and 73 deaths were reported.

On account of the wide-spread infection and the frequent introduction of the disease from other states, quarantine methods have been, and we believe will continue to be insufficient in controlling the epidemic. Vaccination and re-vaccination is the only means to prevent smallpox in the individual; and when a general epidemic of the disease prevails, vaccination is the only measure that will stay its progress.

The State Board of Health is urging general vaccination in every way possible. The railroad authorities promptly adopted its suggestion to have all their employes vaccinated. Employers of large numbers of men in some of the cities where smallpox has prevailed, also adopted this suggestion. But communities should not wait until smallpox breaks out to avail themselves of the protection afforded by vaccination. It should be done in advance.

We bespeak, therefore, your co-operation in our efforts to free the state from smallpox. We should be glad if you would do what many employers have already done—make vaccination a condition of employment. This is but a reasonable measure to protect your business against quarantine interference in case smallpox should occur in your community. If you should not wish to require vaccination, we earnestly hope you will at least bring the matter to the attention of all your employes and urge that it be done. We trust, also, that you will aid and support the local board of health and board

of education in securing the vaccination of school children and others who may need it.

This epidemic of smallpox has already cost a great deal of pain, sickness and death, to say nothing of large money losses; and it may be confidently predicted that so long as a considerable number of our people are unprotected by vaccination and re-vaccination smallpox will continue to prevail.

Praying for your assistance and co-operation, we beg to remain,

Very respectfully yours,

[Signed.] C. O. PROBST, M. D.,

By order of the Board.

Secretary.

The letter met with a cordial reception. Replies were received from a number of manufacturers and others expressing approval of the action taken and promising cooperation. Some asked for large numbers of the circular letter, and these were sent. The health officer of Cincinnati requested 6,000 copies for distribution among the large firms in that city. They were sent. The board of health of Dayton passed a resolution commending the Board's action, and urging all large employers of labor in Dayton to have their men vaccinated.

Another letter, urging vaccination of school children, was sent to each board of education in the state. The letter was as follows:

OHIO STATE BOARD OF HEALTH.

OFFICE OF THE SECRETARY.

COLUMBUS, OHIO, March 2, 1903.

To the Board of Education:

DEAR SIRS—We desire to call your attention to the smallpox situation in Ohio, hoping to enlist your co-operation in efforts for its suppression.

The present epidemic of smallpox in the United States began in 1897, and practically all the states have been invaded, and the disease is still widely prevalent. It made its appearance in Ohio in April, 1898, and since that time more than 16,000 cases have been reported. Its spread has been largely due to its very mild character; but the disease is gradually gaining much greater malignancy. During the year 1902 there were 5,646 cases and 345 deaths reported. During January and February, 1903, there were 1,478 cases and 84 deaths reported.

We may fully expect the epidemic to continue, with possibly increasing severity, unless extraordinary measures can be enforced to prevent it. Owing to the wide distribution of the disease in the state, and its constant introduction from other states, ordinary measures have been, and we believe will continue to be inefficient in staying its progress. As vaccination and revaccination are the only means for preventing smallpox in the individual, so vaccination is the only means whereby an epidemic of the disease can be promptly arrested. An unvaccinated community invites smallpox, and can hardly hope to escape an outbreak under present conditions.

Prior to the present epidemic smallpox was but seldom heard of in this state. On account of this, vaccination has been largely neglected, especially

of children. We appeal to you, therefore, to use your authority as a Board of Education to secure the vaccination of school children under your care.

Section 3986 of the Revised Statutes provides that "The board of each district may make and enforce such rules and regulations to secure the vaccination of, and to prevent the spread of smallpox among the pupils attending or eligible to attend the schools of the district, as in its opinion the safety and interest of the public require; and the board of health and councils of municipal corporations, and the trustees of townships, shall, on application of the board of education of the district, provide at the public expense, without delay, the means of vaccination to such pupils as are not provided therewith by their parents or guardians." (69 v. 22, § 1.)

In a case before the Court of Common Pleas in Columbus, where it was sought to compel the board of education to admit an unvaccinated child to school, this law was upheld.

You will note that the boards of health and councils of cities and villages, and trustees of the township (who constitute a board of health for the township) are required to provide for the vaccination, at public expense, of all the children whose parents or guardians fail to do so.

We most urgently recommend that your board provide for the enforcement of this law without delay. It is suggested that you call a joint meeting of the board of education and board of health to arrange for carrying out an order requiring all school children to be vaccinated. It would be well for the board of education to adopt an order providing that on and after a certain date (allow, say, two weeks to comply with the order) no child shall be permitted to attend school without presenting a certificate from a legally qualified, reputable physician, of having been successfully vaccinated by him. This would not require revaccination except where the child could not produce a certificate from the physician who vaccinated it. In such cases, a certificate of revaccination, whether successfully or not, should be accepted.

While the protection against smallpox afforded by successful vaccination is gradually lost, in many cases, it usually lasts for a number of years. The schools will be very well protected if no child is admitted who has not at some time in its life been successfully vaccinated. Much less opposition will be encountered if revaccination is not insisted upon. It should, however, be recommended.

That vaccination will thoroughly protect the schools against smallpox is well shown by the experience in Chicago. In this city during the last ten years all school children have been vaccinated on entering the school, and revaccinated after seven years. Smallpox has been present in Chicago most of this time, and in 1894-5 there was a severe epidemic with more than 1,000 deaths. In spite of this only seven cases occurred among 260,000 school children, and in each case the pupil was in school with a false certificate.

We most earnestly hope you will give this matter early attention, and make provision, if you have not already done so, for the vaccination of all children attending private or parochial schools in your jurisdiction.

Very respectfully,

[Signed.] C. O. PROBST, M. D.,

By order of the Board.

Secretary.

Every new outbreak of smallpox has been promptly dealt with by a letter of instructions to the local authorities, with proper printed instructions for dealing with smallpox, and pamphlets on its prevention

for general distribution. The telephone is in daily use settling questions of the most diverse character relating to smallpox.

Since the last meeting investigations of suspected smallpox have been made by the secretary or a member of the Board at the following places: Miami Township, Clermont County; Cleveland, Sonora, Zanesville, Columbus, New Concord, Branch Hill, Mason, Lucas Township, Washington County; Oregon Township, Lucas County; Felicity, Findlay and Lebanon.

The Medical Inspectors have visited the following places on account of smallpox: Mendon, Rising Sun, Xenia, Urbana, Galion, Mt. Sterling, Hiram, Lockbourne, Bowling Green, Swanton Township, Lucas County; Madison Township, Fayette County; Palmer Township, Putnam County; Tiffin, Tod Township, Crawford County; Hamilton Township, Franklin County; Georgesville, Jamestown, Dennison, Mt. Sterling, Casstown, Circleville, North Fairfield, Greenwich, Gallipolis (twice).

In all but two instances these visits of the inspectors were paid for by the local authorities.

Dr. J. W. McMurray, of Marion, has been appointed as medical inspector.

In accordance with the vote of the Board, arrangements have been made for a smallpox conference for April 9th. An invitation was sent to each local board of health.

In addition to these investigations of smallpox, Dr. Stanton visited Troy, and Dr. Chapman visited Delphos, on account of proposed sewerage.

Mr. Horton visited Cleveland on account of a serious outbreak of typhoid fever there. I will present his report when desired.

The investigation of the sanitary condition of the Ohio Penitentiary has been started.

Several propositions have been voted upon by mail and should receive ratification by a *viva voce* vote.

In closing it becomes my sad duty to officially notice the death of Mr. Benjamin H. Flynn, engineer of the Board, who died of scarlet fever at his home in Columbus on March 1st, 1903, after an illness of about two weeks. Mr. Flynn was a young man of sterling worth, a close student and an indefatigable worker. He was a junior member of the American Society of Civil Engineers, and at the time of his death was secretary of the Ohio Society of Surveyors and Civil Engineers. His work had already attracted favorable attention outside of the state and a bright future in his profession undoubtedly awaited him. His loss to the Board will be very great, and his premature death is to be sincerely deplored.

Respectfully submitted,

C. O. PROBST,
Secretary.

JUNE MEETING.

The State Board of Health met in regular session at the Hollenden Hotel, Cleveland, at 2 P. M. June 16th, 1903.

There were present: Drs. Miller, Warner, Chapman, Palmer and Mr. Hartzell. Dr. Miller presided.

The secretary reported that Dr. Stanton was detained on account of illness.

On motion of Dr. Chapman a recess was taken until after the close of the evening session of the Ohio Society for the Prevention of Tuberculosis. A meeting of that society was to be held in the Chamber of Commerce in Cleveland at 3 p. m.

SECOND SESSION.

The Board reassembled at 10 p. m. The same members were present as at the afternoon session.

On motion of Dr. Warner it was voted to adjourn until 10 A. M. of the following day.

THIRD SESSION.

The Board met in room No. 328 in the Hollenden Hotel at 10 A. M. of the 17th of June.

The meeting was called to order by the president.

There were present Drs. Crossland, Miller, Chapman, Palmer and Mr. Hartzell.

The minutes of the last meeting were read and approved.

The names of health officers appointed in villages in lieu of a board of health were presented to the Board for confirmation.

The Secretary stated that all of these persons had been appointed by council and proper certification had been made by the village clerk in each instance.

On motion of Dr. Chapman and seconded by Dr. Palmer, the persons named were approved as health officers for their respective villages.

The secretary presented his quarterly report which was approved and ordered filed for publication.

Matters acted upon by mail vote were taken up for confirmation as follows:

Plans for sewage purification works for the village of Newcomers-town, prepared by Mr. Edwin R. Davis of Boston, were approved upon motion of Dr. Chapman, seconded by Dr. Miller.

Those voting in the affirmative were Messrs. Crossland, Miller, Chapman, Palmer and Hartzell.

In the negative, none.

It was moved by Dr. Palmer and seconded by Dr. Chapman that the report of the Committee (Mr. Hartzell and Mr. Pratt) upon the sewage disposal of the Fairmount Children's Home be approved.

Those voting in the affirmative were Messrs. Crossland, Miller, Chapman, Palmer and Hartzell.

In the negative, none.

It was moved by Mr. Hartzell and seconded by Dr. Palmer that the recommendations of Dr. Stanton in regard to modifying the smallpox quarantine being enforced by the Morgan Township, Butler County, health authorities in a railroad camp, be approved.

Those voting in the affirmative were Messrs. Crossland, Miller, Chapman, Palmer and Hartzell.

In the negative, none.

It was moved by Mr. Hartzell and seconded by Dr. Chapman that the rules and regulations adopted by the health officer of Neville, Dr. F. Alex. Joseph, for bettering the sanitary condition of that village be approved.

Those voting in the affirmative were Messrs. Crossland, Miller, Chapman, Palmer and Hartzell.

In the negative, none.

It was moved by Dr. Chapman and seconded by Mr. Hartzell that Mr. O. P. Napier be approved as special health officer for Lakeside.

Those voting in the affirmative were Messrs. Crossland, Miller, Chapman, Palmer and Hartzell.

In the negative, none.

A communication was presented from Mr. M. A. Shaw of Wapakoneta, stating that the village was about to proceed with the construction of sewers upon plans which had been disapproved by the State Board of Health.

After some discussion it was voted, upon motion of Dr. Chapman, that the secretary should refer the matter to the attorney general for advice as to what action the Board could take in the matter.

A report upon an additional water supply for the city of Springfield, prepared by Mr. Pratt, the Engineer, was presented. The plans in brief provide for collecting the ground water contained in a large gravel bed in the valley of Buck Creek by means of an extensive system of drains and conducting it to the present pump well.

It was moved by Mr. Hartzell and seconded by Dr. Chapman that the plans for increasing the water supply for Springfield be approved.

Those voting in the affirmative were Messrs. Crossland, Miller, Chapman, Palmer and Hartzell.

In the negative, none.

The secretary presented a set of rules which he had prepared as a model for the adoption of health officers appointed in lieu of a board of health in villages.

On motion of Dr. Chapman and seconded by Mr. Hartzell, these rules were approved.

Dr. Miller, as chairman of a committee appointed to investigate typhoid fever conditions in Cleveland, presented a report prepared, as he stated, with the assistance of Mr. Hartzell.

On motion of Dr. Palmer and seconded by Dr. Chapman, the report was adopted.

The secretary presented a report upon an investigation of diphtheria at the Ohio Soldiers' and Sailors' Orphans' Home at Xenia.

A communication was presented from Mr. James Case, of Aberdeen, Ohio, asking permission to remove the body of Mrs. F. W. Fulton to Manchester, Ohio, the cause of death having been smallpox.

As it would be impossible in any case for a dead body to be exhumed before the first of October, the Board refused to take any action in the matter at this time.

There being no further business, the Board adjourned.

Attest:

C. O. PROBST,

Secretary.

QUARTERLY REPORT OF THE SECRETARY.

JUNE, 1903.

Mr. President and Members of the Ohio State Board of Health:

Your secretary begs leave to submit the following report of the work done since the last meeting on April 8th, 1903.

The smallpox situation has continued to demand considerable attention, although conditions are improving. Since the last meeting investigations of suspected smallpox have been made by members of the Board at the following places:

Richhill Township, Muskingum County; Zanesville, Addyston, Defiance, Chandlersville, South Lebanon, Cleves, Dresden, Morgan Township, Butler County.

The Medical Inspectors have visited the following places: Clinton Township, Fulton County; Aberdeen, Portage Township, Ottawa County; Biglick Township, Hancock County; Mt. Gilead, Massillon, Corning, Akron, Liberty Township, Henry County; Vermilion, Fletcher and Dresden. These were all paid for by the local health authorities except at Massillon and Vermilion.

May 19th, L. V. Brown, Clerk of Morgan Township, Butler County, reported four cases of smallpox in a railroad camp. May 21st Dr. Stanton made an investigation at the request of the Chief Engineer and Surgeon of the Cincinnati, Richmond & Muncie Railroad. The railroad company requested that the quarantine limits be moved in order that their track might be laid, which was necessary to carry on further construction of the road. The township authorities refusing to consent to this the matter was submitted to the State Board with a report from Dr. Stanton, who recommended that the quarantine be so modified as to permit the work to continue (which he considered could be done with safety). May 29th, after the Board voted to approve Dr. Stanton's recommendations, Dr. Stanton visited the township and rearranged the quarantine to the satisfaction of all concerned.

April 9th, a smallpox conference was held at the office of the Board. About 125 delegates attended.

Several matters have been acted upon by the Board by mail vote, which should now receive a *viva voce* vote.

On April 15th I attended a conference in Chicago to consider amendments to rules governing the transportation of dead bodies. Dr. Bracken of Minnesota, Dr. Wingate of Wisconsin and I represented the Conference of State and Provincial Boards of Health of North America; Mr. Hohenschuh of Iowa represented the National Funeral Directors' Association, and there were present seven delegates from the National Association of General Baggage Agents.

On June 3rd I attended the conference of delegates of State and Territorial boards of health with the Surgeon General of the Public Health and Marine Hospital Service, held at the New Williard Hotel in Washington, D. C., under an act of Congress requiring such a conference to be called annually.

The following states were represented: California, Connecticut, Delaware, Florida, Illinois, Iowa, Kentucky, Louisiana, Maine, Maryland, Michigan, Minnesota, Mississippi, Missouri, Ohio, Oregon, Pennsylvania, Rhode Island, South Carolina, Texas and West Virginia. Also the District of Columbia.

At 10 A. M. there was a short address of welcome by Assistant Secretary of the Treasury Armstrong. This was followed by an address by Surgeon General Wyman. He outlined somewhat fully the character of the work done in his bureau, which has been divided into six divisions. This includes the operation of 19 national quarantine stations, 18 inspection stations, the inspection of all immigrants. The collection and publication of statistics is a part of the work. In this they will co-operate with the Census Bureau. A laboratory is about finished, that is one building, they expect to have four. This is divided into Zoology, Chemistry, Pharmacology and Bacteriology. Special investigations of water pollution will be made. The Bureau has a commission on yellow

fever and one on leprosy. They expect to secure a national home for lepers. They are maintaining a sanatorium for tuberculous seamen. General Wyman pleaded for what he called "team work" or co-operation. He advised the appointment of committees by the conference corresponding to the divisions of his service. The reports of these committees would be acted upon by the conference. A motion was adopted authorizing the chairman, General Wyman, to appoint such committees.

At the afternoon meeting each state was called upon for a brief statement of the laws governing its state and local boards of health, and the chief work of the state board. Not much that was new or of special interest came up.

The delegate from California, the secretary of their new State Board of Health, Dr. Foster, reported upon what was being done to rid San Francisco from the plague. The last case reported there was on March 16th, 1903. There is now, he stated, perfect harmony between and co-operation of the city, state and national authorities, and everything possible is being done to eradicate the disease.

The conference adopted the following resolution:

"WHEREAS the Conference of the State Boards of Health of the United States with the Public Health and Marine Hospital Service, having confidence in the earnest efforts and ability of the Governor and State Board of Health of the State of California acting in harmony with the Bureau of Public Health and Marine Hospital Service to thoroughly eradicate bubonic plague heretofore existing in the city of San Francisco, do resolve that, in the judgment of this Conference, so long as the present effective work is continued, there is no need for quarantine restrictions of travel or traffic to or from that State.

The only other items of special interest were a new law requiring the disinfection of coaches and Pullmans on railroads in Texas, for the prevention of tuberculosis to be done under the supervision of the state health officer; and a law requiring the inspection of lodging houses in Chicago by the State Board of Health with an appropriation of \$25,000 for the work.

General Wyman spoke of an act by the last Congress requiring producers of serums and vaccine virus to get a license to sell from the Secretary of the Treasury. Before giving a license an investigation is to be made by a representative of the army, of the navy, and of the Public Health and Marine Hospital Service.

The conference then adjourned to the call of the chairman.

I spent one day in Philadelphia, with Dr. Flick, and looked into the workings of the Henry Phipps Institute, founded by Mr. Phipps for the study, cure and prevention of tuberculosis. An old house has been temporarily converted into a hospital. It has about forty-five beds. Most of their work is for home patients. Opened in February last, they have already had nearly one thousand patients. Dr. Flick in charge.

I have several special reports which I will ask to bring up at a later hour.

I would report that in accordance with the authority granted at the last meeting, I have engaged Mr. R. Winthrop Pratt of Boston, as engineer.

Respectfully submitted,

C. O. PROBST,
Secretary.

OCTOBER MEETING.

The State Board of Health met in regular session at the office of the Board, in Columbus, at 8 P. M., October 14th, 1903.

There were present Doctors B. Stanton, D. G. Palmer, J. C. Crossland, Frank Warner and Mr. Josiah Hartzell.

Dr. Crossland presided.

The mayor and board of public affairs of Johnstown, and Mr. J. P. Force, consulting engineer, appeared before the Board in reference to the approval pending of a water supply for that village.

Mr. F. I. Consaul, chief engineer of Toledo, presented plans for Sewer Districts No. 39 and No. 40 in that city.

On motion of Dr. Stanton, these plans were referred to a committee of one for an investigation and report.

Dr. Chapman was appointed by the president as this committee.

A delegation of six, authorities and citizens of Kenton, appeared before the Board asking for the approval of plans for Sewer District No. 2 in that city.

Mr. C. Arthur Brown, chemist and bacteriologist at Lorain, addressed the Board upon the subject of water purification in that city; explaining what was being done in the use of copperas as a coagulant in their mechanical filtration plant.

Dr. W. S. Scott, health officer, and Mr. H. M. Redd, city engineer, of Chillicothe, presented plans for additional sewerage for that city.

These various matters were referred, on motion of Dr. Warner, to executive session.

The secretary then read the minutes of the last meeting, which were approved.

On motion of Dr. Stanton, it was voted to proceed with the election of officers.

Dr. Stanton nominated Dr. Wm. T. Miller as president, seconded by Dr. Palmer.

On motion of Dr. Palmer, the Secretary was instructed to cast the ballot of the Board for Dr. Miller as president. The secretary announced that he had cast the ballot, as directed, and Dr. Miller was declared elected president.

Mr. Hartzell nominated Dr. Frank Warner, of Columbus, for vice-president, and moved that the secretary be directed to cast the ballot for Dr. Warner for this position. The motion was seconded by Dr. Palmer and carried. The secretary announced that Dr. Warner was elected vice-president.

Dr. Warner, as vice-president, assumed the chair.

The question of approving the proposed water supply of Johnstown was taken up.

It was moved by Dr. Crossland, and seconded by Dr. Stanton, that the proposed water supply for Johnstown be approved providing that a pumping test, in the presence of the engineer of the Board, establishing the fact that there was no relation between the proposed supply and the surface wells in Johnstown be made, and furthermore that a second analysis of the water after the pumping test had been made proved to be satisfactory.

Those voting in the affirmative were Messrs. Stanton, Palmer, Crossland, Warner and Hartzell.

In the negative, none.

The question of approving plans for sewers for District No. 2 of the city of Kenton was next considered.

It was moved by Dr. Stanton, and seconded by Dr. Palmer, that the plans be disapproved and that it be recommended to the city authorities that they take up the question of purifying all the sewage now discharged into the river.

Those voting in the affirmative were Messrs. Stanton, Palmer, Crossland, Warner and Hartzell.

In the negative, none.

Plans for additional sewerage for Chillicothe being under consideration, Dr. Stanton moved, and it was seconded by Mr. Hartzell, that the plans be approved provided the outlet sewer be carried direct to Paint Creek, and that sewage purification works be introduced whenever, in the opinion of the State Board of Health, this should become necessary.

Those voting in the affirmative were Messrs. Stanton, Palmer, Crossland, Warner and Hartzell.

In the negative, none.

Adjourned on motion of Dr. Stanton to 9:30 a. m., October 15, 1903.

SECOND SESSION.

The Board reassembled at 9:30 A. M., October 15, 1903.

There were present Messrs. Warner, Stanton, Hartzell and Palmer. Dr. Warner presided.

The secretary presented his quarterly report which was approved and ordered filed for publication.

The secretary presented a report of work done in the laboratory, as prepared by the chemist in charge.

The secretary was instructed to notify the absent members of the financial condition of the Board, as set forth in the secretary's quarterly report.

Dr. Warner offered the following resolution and moved its adoption:

WHEREAS, it has come to the attention of the Board that Columbus is making preparation to increase the quantity of her water supply without any present discussion or arrangement looking to the improvement of its quality; that the authorities are arranging to purify the sewage of the city by means of tanks and sand filter beds; and that the quality of water of Columbus is not what it should be by any means; therefore be it

Resolved by the Ohio State Board of Health, that it looks with disfavor upon the proposition for the issuance of bonds which contemplates only increased water supply without at the same time looking to improved quality; that we regard it as unwise that bonds should be issued for the purification of the sewage of Columbus, as badly as it is needed, before bonds have been issued for the purification of the water supply of the city, be it further

Resolved, that while acquiescing in the ultimate plan of purifying the sewage of Columbus, we are firmly of the opinion that this should follow and not precede the purification of her water supply. For, while the sewage emptying into the river is more in the nature of a nuisance disagreeable to the sense of smell, and should be abated as early as possible, the impure and unfiltered water is a constant menace to the health and lives of her citizens, and consequently its purification should take precedence over the purification of the sewage of the city; and be it further

Resolved, that a copy of these resolutions be furnished the city authorities of Columbus with the recommendation that these suggestions be put into execution.

The motion was carried.

Mr. Hartzell presented the following resolutions and moved their adoption:

WHEREAS, about six hundred persons were killed, over one hundred made blind, and over one thousand additional persons either maimed for life or seriously hurt by toy pistols or other explosive appurtenances on the Fourth of July last, and

WHEREAS, the evil results of the free distribution of such explosives must be regarded as a growing, unnecessary, and dangerous evil, therefore

Resolved, that in the opinion of this Board it is the duty of the health authorities of Ohio to prevent the sale of such explosives and to abolish this evil by all lawful means, and

Resolved, that the secretary of this Board be requested to carry into efficiency the spirit of the above resolution by all the means that his judgment may approve.

The motion was carried.

The secretary presented plans, as prepared by the city engineer of Warren, for changes in and additions to the sewer system of that city.

It was moved by Mr. Hartzell, and seconded by Dr. Stanton, that these plans be approved.

Those voting in the affirmative were Messrs. Stanton, Palmer, Warner, and Hartzell.

In the negative, none.

The secretary presented for approval a health regulation for the disposal of refuse, adopted by the health officer of Barberton, acting in lieu of a board of health.

On motion of Mr. Hartzell, seconded by Dr. Palmer, it was voted to amend the resolution by inserting the words "inimicable to public health" after the word "matter" in the fifth line of Sec. 1. The resolution, as amended, was then approved.

The secretary presented a report of an investigation of the water supply at Lakeside, made by the engineer.

On motion of Mr. Hartzell, the secretary was instructed to furnish a copy of this report to the authorities at Lakeside, and to state to them that if the recommendations for improvement of the water supply were not complied with prior to the opening of the grounds to the public next season, the report would be given to the public and measures would be taken as required to protect the public health.

The secretary presented a letter from a number of petitioners, asking permission to open and use the well at the corner of Sycamore and Fifth streets, in Lakeside, for the purpose of watering stock only; and also such a request from Mr. Peter F. Hoiby, former health officer of Lakeside, asking permission to open and use the Bradley Temple well for stock purposes only.

On motion of Dr. Stanton, and seconded by Dr. Palmer, it was voted to permit these wells to be opened for that purpose until May 15th, 1904.

Those voting in the affirmative were Messrs. Stanton, Palmer, Hartzell, and Warner.

In the negative, none.

The secretary presented a letter from the health officer of Miamisburg, recommending that changes in the health laws be made so as to render it possible for joint hospitals for the detention of smallpox cases to be erected.

On motion of Dr. Stanton, the recommendation was approved.

On motion of Dr. Palmer it was voted to hold a joint meeting with local boards of health and health officers in January, 1904, and the secretary was authorized and instructed to prepare a program for the meeting.

Actions of the board by mail vote were taken up for confirmation as follows:

It was moved by Dr. Stanton, and seconded by Mr. Hartzell, to confirm the action authorizing the secretary to approve rules and regulations of health officers, as recommended by the State Board of Health, and where the only change was in Section 16, relating to hogs.

Those voting in the affirmative were Messrs. Stanton, Palmer, Hartzell, and Warner.

In the negative, none.

It was moved by Mr. Hartzell, and seconded by Dr. Stanton, that the water supply for the village of Ottawa, to be obtained from wells in the northeastern part of the corporation, be approved.

Those voting in the affirmative were Messrs. Stanton, Palmer, Hartzell, and Warner.

In the negative, none.

It was moved by Dr. Stanton, and seconded by Dr. Palmer, that the water supply for the village of Milford, to be obtained from wells located on the east side of the Little Miami River above the village, be approved.

Those voting in the affirmative were Messrs. Stanton, Palmer, Hartzell, and Warner.

In the negative, none.

It was moved by Dr. Palmer, and seconded by Mr. Hartzell, that the water supply for the village of Strasburg, to be obtained from driven wells in the easterly part of the village and north of the railway station be disapproved; and that the supply to be obtained from driven wells located west of the village be approved. Also that permission be granted the village to use the present supply, for a period of two years, at the end of which time they are, if necessary, to establish new wells.

Those voting in the affirmative were Messrs. Stanton, Palmer, Hartzell, and Warner.

In the negative, none.

It was moved by Dr. Stanton, and seconded by Dr. Palmer, that the water supply for Barberton be approved, said supply to be obtained from a collecting well to be located at the center of the extreme north end of a parcel of land to be used for water works purposes, and at a distance of about 600 feet north of the present test well.

Those voting in the affirmative were Messrs. Stanton, Palmer, Hartzell, and Warner.

In the negative, none.

It was moved by Mr. Hartzell, and seconded by Dr. Stanton, that the Board refuse to approve the water supply for Bainbridge, already put in, and that the Board reserve the right to condemn the use of the water for domestic purposes should future analyses show evidence of increasing pollution.

Those voting in the affirmative were Messrs. Stanton, Palmer, Hartzell, and Warner.

In the negative, none.

It was moved by Dr. Palmer, and seconded by Dr. Stanton, that the Board approve the change in the public water supply of Oberlin, consisting of the introduction of a softening plant with pressure filters.

Those voting in the affirmative were Messrs. Stanton, Palmer, Hartzell and Warner.

In the negative, none.

It was moved by Mr. Hartzell, and seconded by Dr. Stanton, that permission be granted the city of Lorain to make a test of the use of

copperas as a coagulant in place of alum, for a sufficient length of time to determine its efficiency, a daily report of results obtained to be made to the Board during that period.

Those voting in the affirmative were Messrs. Stanton, Palmer, Hartzell, and Warner.

In the negative, none.

It was moved by Dr. Palmer, and seconded by Mr. Hartzell, that the public water supply for the village of Brookville, to be obtained from a driven well, or wells, located in the southeastern part of the corporation, be approved.

Those voting in the affirmative were Messrs. Stanton, Warner, Palmer, and Hartzell.

In the negative, none.

It was moved by Mr. Hartzell, and seconded by Dr. Palmer, that the plans prepared by Messrs. Snow and Barbour, engineers, for a sewage disposal plant at the Fairmount Children's Home (Alliance) be approved.

Those voting in the affirmative were Messrs. Stanton, Warner, Palmer, and Hartzell.

In the negative, none.

It was moved by Dr. Stanton, and seconded by Dr. Palmer, that plans presented by Mr. J. A. Stewart, village engineer, for sewers for the village of St. Bernard, be approved upon the conditions:

a. That when the intercepting sewer along Ross Run is completed, the village shall secure from the city of Cincinnati the right to tap said sewer and discharge its sewage into it; or

b. Agree to purify the sewage in a satisfactory manner whenever such purification shall be deemed necessary by the State Board of Health.

Those voting in the affirmative were Messrs. Stanton, Warner, Palmer, and Hartzell.

In the negative, none.

It was moved by Mr. Hartzell, and seconded by Dr. Stanton, that the plans for sewerage for the village of Montpelier, with outlet into the St. Joseph River, be approved.

Those voting in the affirmative were Messrs. Stanton, Warner, Palmer, and Hartzell.

In the negative, none.

It was moved by Dr. Palmer, and seconded by Dr. Stanton, that the plans for sewers for District No. 3 of the city of Mount Vernon be disapproved unless some satisfactory provision be made for purifying the sewage at this time; the Board being convinced that the amount of sewage they are proposing to convey to the river, added to what is already reaching the river from that city, would be too great a burden for the stream to carry.

Those voting in the affirmative were Messrs. Stanton, Warner, Palmer, and Hartzell.

In the negative, none.

It was moved by Dr. Stanton, and seconded by Mr. Hartzell, that the plans prepared by Mr. M. B. Burke, C. E., for a sewer for the village of Winton Place, providing for a temporary outlet into Mill Creek, be approved, provided that whenever a trunk sewer shall be constructed to carry off the sewage now entering Mill Creek, said trunk sewer will be made use of as an outlet for the sewage of Winton Place.

Those voting in the affirmative were Messrs. Stanton, Warner, Palmer, and Hartzell.

In the negative, none.

It was moved by Mr. Hartzell, and seconded by Dr. Palmer, that the plans prepared by Messrs. Snow and Barbour, engineers, for a system of sewers for the village of Cuyahoga Falls, with outlet to the Cuyahoga River, be approved upon the conditions:

1. That the sewer outlet be an iron pipe carried over the gorge, discharging into the river, and
2. That the village agree to purify the sewage in a manner satisfactory to the State Board of Health whenever, in the opinion of said Board, such purification shall be deemed necessary.

Those voting in the affirmative were Messrs. Stanton, Warner, Palmer, and Hartzell.

In the negative, none.

It was moved by Dr. Stanton, and seconded by Dr. Palmer, that the plans, prepared by Earnshaw and Punchon, engineers, for a system of sewers for the village of Bond Hill, be approved, with a temporary outlet into Ross Run, and a permanent outlet into a sanitary sewer now, being constructed by the city of Cincinnati. (The sanitary sewer is to be completed within one year.)

Those voting in the affirmative were Messrs. Stanton, Warner, Palmer, and Hartzell.

In the negative, none.

It was moved by Dr. Palmer, and seconded by Mr. Hartzell, that the plans prepared by the city engineer, for sub-main sewer District No. 1, of Main Sewer District No. 16, for the city of Toledo, be approved, with outlet into Ten Mile Creek or the Ottawa River.

Those voting in the affirmative were Messrs. Stanton, Warner, Palmer, and Hartzell.

In the negative, none.

It was moved by Mr. Hartzell, and seconded by Dr. Stanton, that the plans prepared by the city engineer, Mr. F. M. Lillie, for Sewer District No. 7, of the city of Youngstown, with outlet into Dry Run, about 1,000 feet above its confluence with the Mahoning River, be approved, subject to the condition that satisfactory purification works shall be installed whenever deemed necessary by the State Board of Health.

Those voting in the affirmative were Messrs. Stanton, Warner, Hartzell, and Palmer.

In the negative, none.

It was moved by Mr. Hartzell, and seconded by Dr. Stanton, that the village health officers appointed in lieu of a board of health, as presented by the secretary, be approved.

Those voting in the affirmative were Messrs. Stanton, Warner, Hartzell, and Palmer.

In the negative, none.

It was moved by Mr. Hartzell, and seconded by Dr. Stanton, that the rules and regulations adopted by health officers of villages, as presented by the secretary, be approved.

Those voting in the affirmative were Messrs. Stanton, Warner, Hartzell, and Palmer.

In the negative, none.

It was moved by Dr. Palmer, and seconded by Dr. Warner, that the rules for Plainfield and Racine, which were disapproved, be approved as revised.

Those voting in the affirmative were Messrs. Stanton, Warner, Palmer, and Hartzell.

In the negative, none.

There being no further business the Board adjourned.

C. O. PROBST,

Secretary.

Attest:

QUARTERLY REPORT OF THE SECRETARY.

October, 1903.

Mr. President and Members of the Ohio State Board of Health:

Your secretary respectfully presents the following report of work done since the last meeting, June 17th.

Smallpox has continued to prevail, though to a less extent than formerly. The total number of cases reported from June 6th to October 10th was 849, with 31 deaths. On the latter date the disease was reported present in 29 places and 22 counties.

On July 3rd the president, Dr. Crossland, and the secretary held a conference with the board of health of Zanesville in reference to smallpox conditions at that place. Measures for dealing with their outbreak were fully discussed. The disease has now been abolished there, no cases having been reported since September 19th.

Since the last meeting investigations of suspected smallpox have been made by a member of the Board or the secretary at the following

places: The Girl's Industrial Home (Delaware), Zanesville, Addyston and Philo.

The medical inspectors have visited the following places on account of smallpox: Beaver Creek Township, Greene County; Greenfield Township, Fairfield County; Irondale, Bucyrus, Canal Dover, Carey, Ridge Township, Crawford County; West Liberty, Dennison, Pultney Township, Belmont County; Harrison Township, Champaign County; Xenia, Uhrichsville, Portage Township, Wood County; Germantown, Somerset, Glenford, and Columbus Grove.

In all but three of these inspections the authorities bore the expense.

In addition to these investigations of smallpox, Dr. Laudick visited Goshen Township, Auglaize County, on account of scarlet fever; the secretary visited Youngstown on account of water supply; Millersburg on account of a nuisance caused by imperfect sewerage; Gambier on account of an outbreak of scarlet fever; and Chillicothe on account of sewerage; Dr. Stanton visited St. Bernard and Bond Hill on account of sewers, and Milford on account of a water supply; Dr. Chapman investigated a nuisance at Chicago Junction; Mr. Hartzell visited Youngstown on account of sewerage, and the bacteriologist visited Lakeside on account of the water supply.

The engineer made the following inspections: Shepardson College, Granville, on account of sewerage; Celina, water supply; Ottawa, water supply; Strasburg, water supply; Montgomery County Infirmary, sewage disposal; Murray City, water supply; Barberton, water supply; Youngstown, water supply; Bainbridge, water supply; Marysville, sanitary condition; Montpelier, sewerage; Scio, water supply; Mt. Vernon, sewerage; Batavia, sewerage; Cuyahoga Falls, sewerage; Johnstown, water supply; Lakeside, water supply; Put-in-Bay, sanitary condition; Kenton, sewerage; Brookville, water supply; West Manchester, water supply; Cleveland, to inspect the alleged pollution of the public water supply, and Lorain to inspect the purification plant.

The report of the engineer upon the sanitary condition of Put-in-Bay was sent to the petitioners, the local board of health, and the council, and the latter was urged to put in a sewerage system and a public water supply and to abandon all wells and cesspools. The mayor replied that the matter of a sewer system would be considered by council.

The B. & O. railroad authorities were written to in regard to the nuisance at Chicago Junction, reported upon by Dr. Chapman.

A copy of the engineer's report on Marysville was sent to the local board of health.

The several questions that have been voted upon by mail should now receive ratification by a *viva voce* vote.

September 5th the secretary, with Dr. Smith, health officer of Columbus, investigated the condition of Alum Creek, from the Main Street

bridge to the garbage disposal plant, complaints having been received from the township board of health of a nuisance caused by the sewage of Columbus. The creek was found in a highly polluted condition and was undoubtedly a just cause for complaint. I reported to the township authorities that the nuisance undoubtedly existed and advised them to endeavor to have it abated by the county commissioners. I pointed out to them, what seems to be not generally known, that sections 6920a, 6920b, and 6920c, authorize the county commissioners to appoint an inspector of nuisances, who is empowered to institute prosecution against any person or corporation responsible for a nuisance of this character. The prosecuting attorney is the legal adviser of such inspector and the commissioners may allow him, out of the county treasury, such compensation as they deem proper.

The voters of Columbus will vote at the fall election upon the issuing of bonds for \$1,200,000 for the establishment of sewage purification works, which would abate this nuisance and also the nuisance arising from the pollution of the Scioto River.

The following correspondence will show the situation at Wapakoneta as regards sewerage construction:

COLUMBUS, OHIO, July 1, 1903.

HON. J. M. SHEETS, *Attorney General, Columbus, Ohio*:

DEAR SIR:—Will you kindly advise the State Board of Health as to the action it can and should take in regard to the following matter?

The village of Wapakoneta is located upon a small stream, and for years, during dry seasons, there have been complaints of its pollution by the sewage from that village. In April, 1901, plans for greatly extending their sewers already in use, with an outlet to this same stream, were presented to the Board, and were disapproved for good and sufficient reasons.

In June, 1902, plans for a different system, but with an outlet direct to the river, were also disapproved, and the authorities of Wapakoneta were notified that they must provide proper means to purify the sewage before approval would be given to extend their sewers.

In October, 1902, plans for a system of sewers and sewage purification works for Wapakoneta were presented, and were approved by the Board.

It now appears that council proposes to construct a new sewer which will serve a considerable part of the village, and discharge the sewage into the river without purification. Bids for this work have already been received.

In Section 409-25 R. S. it is provided that "No city, village, corporation or person shall introduce a public water supply or system of sewerage, or change or extend any public water supply or outlet of any system of sewerage now in use, unless the proposed source of such water supply or outlet for such sewerage system shall have been submitted to and received the approval of the State Board of Health."

I am instructed by the Board to inquire of you whether the building of this sewer in defiance of law and the Board's action cannot be prevented; and if so, what proceedings should be taken in the premises.

Ver respectfully,

(Signed) C. O. PROBST,
Secretary.

COLUMBUS, OHIO, July 2nd, 1903.

DR. C. O. PROBST, *Secretary of State Board of Health, Columbus, Ohio:*

DEAR SIR:—I am in receipt of yours of the 1st instant, stating certain facts with regard to the construction of a sewer system in the village of Wapakoneta, Ohio, and asking for my opinion relative to the powers of the State Board of Health in the premises.

From your letter I am informed, that in April, 1901, certain plans for extending the sewers for that municipality were presented to the State Board of Health and were disapproved for good and sufficient reasons. In June, 1902, plans for a different system were also disapproved and the authorities of that village were notified that they must provide a proper means to purify the sewage before approval would be given to extend their sewers. In October, 1902, certain plans were presented and were approved by the State Board of Health, but it now appears that the village council proposes to construct a system not in accordance with the plans submitted, and which have been approved by the State Board, but according to a plan which has been expressly disapproved by said State Board.

Section 409-25 R. S., of Ohio provides that "No city, village, corporation or person shall introduce a public water supply or system of sewerage or change or extend any public water supply or outlet of any system of sewerage now in use, unless the proposed source of such water supply or outlet for such sewerage system shall have been submitted to and received the approval of the State Board of Health."

Section 409-29 R. S., provides that prosecutions and proceedings may be instituted by the State Board of Health for the violation of any of the provisions of that chapter, or for the violation of any of the orders or regulations of the State Board, and that such prosecution and proceeding shall be instituted by the secretary on the order of the president of the Board.

Section 2119 R. S., provides a penalty for violating any order or regulation of the Board of Health or for obstructing or interfering with the execution of any order, or wilfully or illegally omitting to obey such order. The penalty is a fine in any sum not exceeding \$100 or imprisonment for any time not exceeding 90 days or both.

By Section 2122 R. S., the State Board is authorized to bring civil actions for the abatement or removal of all nuisances, and the right to abate a nuisance, created by an imperfect or improper sewerage system, is fully conferred upon that Board and may be instituted upon your request by the Attorney General to abate the same.

So in conclusion I would say that the remedy afforded by the statutes is full and complete both as to the rights to proceed by criminal process, and also by civil action.

Very truly yours,

(Signed) J. M. SHEETS,
Attorney General.

COLUMBUS, OHIO, August 14, 1903.

MR. H. C. WENTZ, *Mayor, Wapakoneta, Ohio:*

DEAR SIR:—We have been informed that it is the intention of your village to construct sewers and discharge them into the river without building at this time sewage disposal works as approved by the State Board of Health. I wrote to the board of public service of Wapakoneta on August 4th, asking whether this was a correct statement and have received no reply. I will ask you now to please give the facts in the case.

I hope we have been misinformed in this matter, for the Board is prepared to use all of its powers to prevent the discharge of any additional unpurified sewage into the river at Wapakoneta.

Yours truly,
(Signed) C. O. PROBST, *Secretary.*

WAPAKONETA, OHIO, August 18, 1903.

STATE BOARD OF HEALTH, *Columbus, Ohio:*

GENTLEMEN:—In reply to your inquiry of the 14th inst. I will say there has been no steps taken towards building a sewage disposal works for this village although some sewers are being built. I believe the council proposes to take this matter up in the near future. At present the village is financially embarrassed.

Very respectfully,
(Signed) H. C. WENTZ,
Mayor of Wapakoneta."

COLUMBUS, OHIO, August 20th, 1903.

MR. H. C. WENTZ, *Mayor, Wapakoneta, Ohio:*

DEAR SIR:—I am just in receipt of your letter of the 18th inst. I understand by it that your village is propopsing to build new sewers but no sewage purification works at the present time.

As you know, the State Board of Health has disapproved the building of additional sewers in Wapakoneta unless the sewage is purified in a satisfactory manner. I have submitted this matter to the Attorney General, who advises us that our Board has ample authority to enforce this order. You are therefore notified that should the village go on and build these sewers and attempt to use them without putting in purification works, our Board will exercise its powers in the matter.

Yours truly,
(Signed) C. O. PROBST, *Secretary.*
Respectfully submitted,
C. O. PROBST, *Secretary.*



PUBLIC WATER SUPPLIES.

REPORT ON THE WATER SUPPLY OF BAINBRIDGE.

The health officer of Bainbridge made application for the Board's approval of a water works which they had recently installed. The engineer, Mr. Pratt, visited Bainbridge July 21st, 1903, to make an investigation. He reported as follows:

"Bainbridge is a village of about 1,200 inhabitants, situated in the south part of Ross County, in the valley of Paint Creek.

"Works, costing \$16,000.00, constructed principally for fire protection and sprinkling purposes, have been in use a short time. It is desired that the water supplied by these works be suitable for domestic purposes although it has not yet been used in this way.

"The well which supplies water to the works is located in the rear and just south of the electric light station. It is a dug well, 10 feet in diameter, with a brick lining, the bottom of which rests upon the limestone at a depth of about 30 feet below the surface of the ground in the immediate vicinity. During the construction of the well it was found that there was a small flow of water through the gravel from the direction of the village but that upon cutting into the limestone water appeared in large quantities and rose to an elevation of nine feet above the limestone. Pumping tests have shown a continued yield of 15,000 gallons per hour from the well.

"The thickly built up portion of the village has a slight slope toward the well and is within 2,000 feet of it, the nearest house being but 200 feet away. The geological formation under the village is as follows: First, two or three feet of soil, then 30 or 35 feet of gravel, under which is a stratum of limestone, which appears to have an inclination toward the south opposite to the direction of the surface slope.

"The location of the well is such that the water will at some time become polluted with unpurified sewage, though at present, as shown by the chemist's report, the water has become well purified in its passage through the ground before reaching the well. The source of supply then, may be considered safe at present but very likely to become contaminated in the future."

Samples of the water were collected and sent to the laboratory for examination. Mr. Horton, the chemist, reported upon these as follows:

REPORT OF EXAMINATION OF WATER FROM BAINBRIDGE.

PARTS PER MILLION.

	Test Well.	Private Well.
Source of sample	2901.	2947.
Number of sample	12.	6.
Color	trace	none
Turbidity	trace	none
Sediment	very faint	none
Odor	1.25	1.05
Oxygen required .....	.042	.042
N. as ammonia albuminoid .....	.003	.014
N. as ammonia free .....	.005	.001
N. as nitrites	19.2	29.4
N. as nitrates	15.5	29.3
Chlorine	303.	348.
Alkalinity	70.	91.
Incrusting constituents	610.	806.
Total solids	124.	
Loss on ignition .....	.35	.1
Iron	1700.	
Bacteria per c c	no	
Colon bacilli present in 50 c c.....		

"Sample No. 2,901 is from a test well. The presence of a trace of iron keeps this water from being perfectly clear, but the effect is so slight as to be of no moment unless the amount of iron should increase considerably. The test well sample is inferior in this respect to the water from the private well. The water is pretty hard, as shown by the findings for alkalinity and incrusting constituents, but fortunately for boiler purposes the scale forming material (incrusting constituents) constitutes the smaller portion of the hardness. This water is quite a little softer than the sample from the private well.

"As regards fresh organic pollution this water shows quite satisfactory results, but the nitrates and chlorides show there has been considerable 'past pollution'. This pollution of the water prior to its reaching the well presumably came from the sewage of the village. The presence of some nitrites would ordinarily indicate incomplete purification of the pollution, but in a new well there are sometimes other opportunities for nitrites. In the absence of intestinal bacteria, and with the purification shown by the other findings of the analysis, it is not to be thought that the use of this water would at this time cause disease, nor can it be said that at any definite time in the future the use of this water would result in disease. But with such high nitrates and chlorides we have evidence of strong past pollution, and if a break of any kind comes by which the water is allowed to reach the wells without a proper purification, then there would be great danger. It is impossible to say that such a break may not occur as soon as the well is put in use and a considerable amount of water drawn continuously from it.

"Although the water could be used in its present state, it is to be looked upon as undesirable and as not suited for a safe public supply on account of its not being out of the range of sewage influence.

"Sample No. 2,947 is from a private well. This water is much like the preceding, except that it shows a much greater influence from purified sewage (see nitrates and chlorides) and is just that much more undesirable and unsafe. The influence here appears to come from the privy vault some 80 feet away."

The question of approving this water supply was submitted to the State Board of Health and on September 1st, 1903, the following notice was sent to the health officer:

"The State Board of Health has considered the question of the new public water supply for Bainbridge. The work in seeking this supply had been practically completed before the matter was called to the attention of this Board. This was done contrary to law. There would seem to be no excuse for it, as the law has been in operation since 1893, and the papers have contained notices of hundreds of similar cases in which the Board has taken action.

"While you have already introduced the supply the Board would be glad to approve it did the facts justify. The report of the engineer of the Board, however, shows that the wells are not favorably located and that their position is such that they are liable to become contaminated from the sub-surface pollution of the village site. The analyses of the samples of the water, a copy of which is enclosed, corroborate the observations of the engineer. As stated in the chemist's comments upon the results of the examination, 'Although the water could be used in its present state, it is to be looked upon as undesirable and as not suitable for a safe public supply on account of its not being out of the range of sewage influence.'

"The Board therefore has refused to approve the supply. The village may go on using it at its own risk, and the Board will reserve the right to condemn the use of the water for domestic purposes, should future analyses show evidences of increasing pollution."

At a Board meeting, held October 15, 1903, this action was confirmed by *viva voce* vote.

REPORT ON PROPOSED WATER SUPPLY FOR BARBERTON.

Application having been made by L. Miller, mayor, for the approval of a water supply for the village of Barberton, the engineer, Mr. Pratt, visited that village on July 15th, 1903, to make an investigation and reported as follows:

"Barberton is an incorporated village of about 8,000, located in the northeasterly part of the state, in the extreme northerly portion of the Tuscarawas watershed. The village has nearly doubled in size during the last five years owing to the various industries established there, and conditions are favorable for further rapid growth in the near future.

"At present water from the Ohio and Erie Canal is supplied to about 4,000 persons, or one-half the inhabitants. The village pays the State of Ohio for the privilege of using the water and the Diamond Match Company for pumping it. The present consumption is said to be 1,250,000 gallons per day, but this figure is probably too large as all the factories in the town have private wells and do not have to use the public supply. With only 4,000 people using this water, the consumption per consumer would be over 300 gallons daily which is excessive. It is probable therefore that 1,250,000 gallons per day would be quite sufficient to supply the entire village for all except manufacturing purposes for some time to come. The village considers 2,000,000 gallons per day necessary.

"The poor quality of the canal water together with the fact that the present arrangement is not economical for the village are the reasons for desiring a new supply; and if the proposed works are constructed, all connection with the canal water will be discontinued.

"Extending in a northerly direction from the village as far as the 'Great Divide' is a valley, having an area inside its watershed line of perhaps 25 square miles. At the bottom of the valley throughout nearly its entire length are broad meadow lands which are partially drained by a small stream inappropriately called Mud Run. The entire valley is underlaid with extensive gravel deposits from which, it is said, water may be obtained at any point.

"It is proposed by the village to buy for waterworks purposes a four and one-half acre lot at the lower end of the valley in Norton Township, and about one and one-half miles north of the center of the village near County Road. The lot borders upon Mud Run and is low and swampy.

"For the most part the valley is sparsely settled and devoted to farming, there being on the westerly and northerly side of the proposed location no houses within 1,000 feet and but five or six within a mile. Easterly, however, from the lot, on the opposite side of the run, within 2,000 feet is a settlement of 20 houses, the nearest of which is but 250 feet distant. More will probably be built. The houses are all provided with privies built in the clay stratum over the water bearing gravel, and sink wastes are disposed of by turning them into the gardens.

"Three test wells of one and one-half inch iron pipe have been driven and are described as follows:

"Well No. 1, 5 feet west of run, 85 feet deep, through 18 feet clay, 20 feet sand and gravel, 25 feet clay, remainder gravel. Flowing.

"Well No. 2, 100 feet west of run, 25 feet deep, through 18 feet clay and then gravel. Flowing.

"Well No. 3, 350 feet west of run, 50 feet deep, through 18 feet clay, 20 feet sand and gravel, small amount of rock, remainder gravel. Water stands within one foot of top.

"It is intended to build a brick collecting well from which water is to be pumped directly into the distributing system.

"The flow from well No. 1 was measured and found to be about 250,000 gallons per day and the flow from No. 2 appeared to be about the same. This yield together with the geological formation of the valley indicates that water can be obtained from this vicinity in sufficient quantities for a public supply, and the chemist's report indicates that it is of a suitable quality.

"The location proposed, though furnishing a safe and satisfactory water at present, is not as desirable on account of the little settlement a short distance east, as one about one-half mile further up the valley in a northerly direction would be. In this latter locality meadow land at a considerable distance from any street or dwelling could be obtained at less cost than that which it is now proposed to take, the available quantity of the water would probably be but little less, and the quality if not better now would probably be so in the future. The increased cost would be in the longer water main required.

"The corporation is going outside of its limits for a water supply, and it is important that it should go as far away from habitation as possible, as it will own but a small part of the watershed from which its water will be taken, and will be unable to control the sanitary condition of the houses that may be built near its works.

"It is recommended by your engineer that the waterworks be constructed about one-half mile north of the proposed location; and in case of increase in the amount of iron now present in the water a standpipe or reservoir be provided to allow for its reduction by oxidation and sedimentation."

Samples of water were collected and sent to the laboratory for examination, and the chemist, Mr. Horton, reported upon them as follows:

REPORT OF EXAMINATION OF WATER FROM BARBERTON.

PARTS PER MILLION.

Source of sample	Well No. 1.	Well No. 2.	Well No. 3.	White House Well.
Number of sample	2896.	2897.	2898.	2899.
Color	12.	12.	12.	10.
Turbidity	trace	none	trace	slight
Sediment	trace	none	trace	slight
Odor	none	none	none	none
Oxygen required	1.05	.55	.76	.72
N. as ammonia albuminoid .....	.038	.022	.022	.010
N. as ammonia free.....	.018	.008	.012	.036
N. as nitrites	trace	none	none	trace
N. as nitrates	trace	none	trace	none
Chlorine	5.4	2.7	6.1	2.4
Alkalinity	160.	163.	159.	152.
Incrusting constituents ..	none	21.	none	none
Total solids	224.	248.	221.	217.
Loss on ignition	53.	54.	46.	48.
Iron .....	.7	.3	.5	1.4
Bacteria per c c.....	600.	70.	140.	2500.
Colon bacilli present in 50 c c	no	no	no	no

"These samples were received on the 17th inst., having been collected by Mayor L. Miller from three wells of the proposed supply and from a private well.

"Nos. 2,896-2,898. Wells No. 1, No. 2, and No. 3. These waters are so similar they may be treated as one, for they belong to the same class. The difference between No. 2,896 and 2,898 is insignificant, while No. 2,897 differs from them somewhat in the findings for chlorides and incrusting constituents. The latter well is from a different depth than the other two and this no doubt causes the difference in findings. There is a small amount of iron in these three waters which may cause a trace of cloudiness in the supply, but will not prove objectionable unless the amount of iron becomes greater. The waters are soft for ground waters, and as the analyses indicate their relative freedom from organic pollution, they would be considered desirable waters for a public supply as far as quality is considered as long as they maintain their present character.

"No. 2,899. This water is not materially unlike those from the wells of the proposed supply, but is higher in iron. From some cause the number of bacteria is also high. It is a usable water for domestic purposes."

The question of approving this source of water supply for Barber-ton was submitted to the Board and on August 3rd, 1903, the mayor was notified that the Board had voted to approve of a public water supply to be obtained from a collecting well located at the center of the extreme north end of a parcel of land to be used for water works purposes and at a distance of about 600 feet north of the present test wells.

At a meeting of the State Board of Health, held October 15th, 1903, this action was confirmed by a *viva voce* vote.

REPORT ON A PROPOSED WATER SUPPLY FOR BROOKVILLE.

The board of public affairs of the village of Brookville having requested the approval of a public water supply for the village, the engineer, Mr. Pratt, visited Brookville, September 16, 1903, and reported as follows:

"The village of Brookville, Montgomery County, having a population of nine hundred, proposes to construct waterworks, the source of supply for which is to be taken from a driven well five and five-eighths inches in diameter and sixty-two and two-tenths feet deep. The well is located in the southeastern part of the corporation about eight hundred feet from the edge of the thickly built up portion and separated from this portion by the valley of a small run which would effectually prevent any surface drainage from the direction of the village reaching the top of

the well. There are only a half dozen houses located on the land sloping toward the well and the nearest of these is four or five hundred feet distant.

"The geological formation through which the well is driven is as follows: hardpan, 16 feet; gravel, clay, sand and quicksand, 12 feet; then 32 feet of yellow limestone in which the water is found; blue rock, 1 foot, and blue clay, 6 inches. The well flows continuously at the rate of about 30 gallons per minute. The pumping test at the time the sample was collected showed an available quantity of 200 gallons per minute.

"For forcing the water into the distribution system it is proposed to install a compressed air system which is manufactured and is to be put in by the National Construction Company of South Bend, Ind.

"From a strictly sanitary standpoint the analysis shows that the water is very satisfactory. It contains, however, considerable iron, some of which could be removed if a standpipe or reservoir were built instead of the proposed compressed air system."

Samples of the water were reported upon by the chemist as follows:

REPORT OF EXAMINATION OF WATER FROM BROOKVILLE.

PARTS PER MILLION.

	Eggleston Well.	Second Test Well.
Source of sample	3124.	3125.
Number of sample	10.	25.
Color	slight	slight
Turbidity	very slight	very slight
Sediment	none	none
Odor .....	.54	.16
Oxygen required .....	.032	.030
N. as ammonia albuminoid .....	.302	.320
N. as ammonia free	trace	trace
N. as nitrites	none	none
N. as nitrates	1.9	2.3
Chlorine	403.	365.
Alkalinity	none	none
Incrusting constituents	458.	474.
Total solids	130.	129.
Loss on ignition	1.0	1.5
Iron	13.	7.
Bacteria per c c	no	no
Colon bacilli present in 50 c c.....		

"These samples are so similar that they would be placed in the same class. Both are unusually good waters as regards their freedom from organic pollution either of a vegetable or animal nature. They show the characteristics of deep waters and therefore the free ammonia is permissible and not to be considered with the same meaning that it would be in a surface water. These waters are all but free from bacteria, and no intestinal bacteria were present.

"There are two objections to these waters, viz., iron and alkalinity, but neither of these is in such quantity as to be detrimental to health.

The second test well is considerably higher in iron than the Eggleston well. The amounts of iron present cause the water to appear more or less roilly and would also lead to some complaint from the stains that would be caused by the iron, provided there is no opportunity for removal of the iron.

"The alkalinities of these waters are high, and they will be found to be soap consumers, but on the other hand, those substances that form a scale in boilers are absent. The alkalinity of the second test well is somewhat lower than that from the Eggleston well sample.

"The analyses indicate that with the exception of the iron and the hardness these waters would make a desirable public supply. With these undesirable features, which are undesirable but do not prohibit the use of the waters, the analyses indicate the waters should be classed as usable, but with the objections noted."

The State Board of Health considered this water supply for the village of Brookville and voted to approve the same.

On October 3, 1903, Mr. O. E. Baker, president of board of public affairs, was notified to this effect.

At a meeting of the Board held October 15th, 1903, this action was confirmed by *visa voce* vote.

REPORT ON PROPOSED ADDITION TO WATER SUPPLY OF CADIZ.

The village of Cadiz wishing to make an addition to their present water supply submitted a sample of water from proposed well and the information used in the following report was sent to the Board by the secretary:

"The village of Cadiz, Ohio, through the superintendent of water-works, Mr. J. Clark Moore, has made application for the approval of a new well to increase their present public water supply, which has failed during this summer. The new well is located 4,350 feet south of their pumping station (they pump by air) and is about the same distance from wells, which were approved by this Board in 1895. There are no sources of pollution near the new well, and the geological formation is about the same as that of wells already approved, namely:

Clay.....	3 feet
Gray shale.....	20 feet
Brown shale.....	100 feet
Sand rock.....	20 feet
Gray slate.....	55 feet
Red slate.....	12 feet

"The well is 210 feet deep, the first finding of water being at 65 feet, and the second at 135 feet. The well is cased to a depth of 63

feet. I attach hereto a report of the chemist on examination of the water. The location, surroundings and geological formation all being favorable, I would recommend that this additional supply for Cadiz be approved."

REPORT OF EXAMINATION OF WATER FROM CADIZ.

PARTS PER MILLION.

	Drilled Well	Drilled Well.
Source of sample	3211.	3212.
Number of sample	trace	trace
Color	175.	175.
Turbidity	slight	slight
Sediment	none	none
Odor .....	.91	.93
Oxygen required .....	.216	.212
Ammonia free .....	.036	.034
Ammonia albuminoid	none	none
N. as nitrates	trace	trace
N. as nitrites	2.8	
Chlorine	326.	325.
Alkalinity	none	
Incrusting constituents	385.	
Total solids	108.	
Loss on ignition	1000.	1200.
Bacteria per c c	not in 50 c c	not in 50 c c
Colon present		

"The analyses show that the waters are similar. The analysis shows a comparative freedom from sewage or other organic matter, and the water is therefore a safe one to use. The alkalinity is rather high, but as no scale forming materials are present (see incrusting constituents) it should prove a fairly satisfactory water for boiler uses.

"The one unfavorable item worthy of consideration is the presence of some iron which gives the water its turbid appearance, this is a minor objection and one not involving the health of the consumer, but it is mentioned because some complaints will arise on account of the appearance of the water and of its staining properties. This is a usable water and aside from its iron it is quite a desirable one for an addition to a public supply."

The State Board of Health considered this additional supply for the village of Cadiz and on November 19th, 1903, Mr. J. Clark Moore, superintendent of waterworks, was notified that said additional supply had been approved by the Board. At a meeting, held October 15th, 1903, the Board confirmed this action by *viva voce* vote.

REPORT ON PROPOSED WATER PURIFICATION FOR ELYRIA.

L. E. Chapin, consulting engineer, acting for the city of Elyria, submitted plans and specifications for a mechanical filtration plant for pur-

ifying Lake Erie water. The engineer, Mr. Pratt, reviewed these plans and made the following report:

"In 1896 the State Board of Health approved of Lake Erie as a source of water supply for Elyria, but recommended filtration. Plans and specifications for a filter plant are now submitted for approval.

"The location selected is about three miles west of Lorain on the shore of the lake and the intake extends 1,500 feet from the shore.

"The filters are to be installed by the New York Continental Jewell Filtration Company, which company, as shown with the specifications, makes the following guarantee:

"The removal of the bacteria will not be less than the following: When the applied water contains 3,000 or more bacteria per cubic centimeter, 98 per cent. to be removed by the process. And when such applied water shall contain less than 3,000 bacteria per cubic centimeter, the bacteria in the filtered water shall not be more than 100 per cubic centimeter.

"The filtered water shall be clear, odorless, free from turbidity, and free from all matters in suspension as seen by the naked eye.

"The method proposed, and the operation of the same shall meet with the approval of the State Board of Health, and the results of such operation so far as fulfillment of efficiency, to be determined by such chemist and bacteriologist as may be approved by said Board of Health.'

"The standard here specified though as high as has generally been agreed to by filter manufacturers should not at this time be approved permanently by the State Board of Health, as it is probable that on account of improvements in building and operating mechanical filters better efficiency will be obtained in the future.

"As is stated in the specifications the original intention was to use as a coagulant iron sulphide or sulphate which was to have been made at the plant by means of the "Jewell Iron Process" from scrap iron and sulphur but later it was decided to use copperas, as made by the American Steel and Wire Company and which is said to be less liable to attack iron parts of the filter and also to be more efficient than the coagulant first proposed. On account of the comparatively small amount of data from which the Board can judge of the suitability of this coagulant, its use should not be approved unconditionally.

"The plans should be approved subject to the following conditions:

"1. That the city employ a competent bacteriologist during the first two months the plant is in operation to make daily analyses and to instruct those in charge in regard to the proper care of the filters and especially as to the proper amount of coagulant to be used under various conditions of the raw water.

"2. That the State Board of Health reserve the right to require higher standards of efficiency if considered practicable in the future.

"3. That any change in the method of operation or use of coagulant, deemed necessary by the Board, shall be made when desired."

The State Board of Health considered plans for a mechanical filtration plant for the city of Elyria and on January 4th, 1904, the consulting engineer, Mr. L. E. Chapin, was notified that said plans had been approved, subject to the following conditions:

1. That the city employ a competent bacteriologist during the first two months the plant is in operation to make daily analyses and to instruct those in charge in regard to the proper care of the filters and especially as to the proper amount of coagulant to be used under various conditions of the raw water.

2. That the State Board of Health reserved the right to require higher standards of efficiency if considered practicable in the future.

3. That any change in the method of operation or use of coagulant, deemed necessary by the Board, should be made when desired.

At a meeting of the Board, held January 20th, 1904, this action was confirmed by *viva voce* vote.

REPORT OF A PROPOSED WATER SUPPLY FOR FINDLAY.

The waterworks trustees, through the board of health of Findlay, made application for the Board's approval of a proposed public water supply for that city. The engineer, Mr. Flynn, visited Findlay June 5th, and in company with the members of the waterworks board and of the local board of health, made an investigation of the proposed supply. He reported as follows:

"It is proposed to obtain the supply from what is known as Limestone Ridge in Big Lick Township, at a point nine and three-fourths miles due east of Findlay. The water is to be obtained from a number of wells drilled in the bottom of an old lake bed; these wells going through some 12 feet of soil and dry muck and entering the limestone bed rock in which the water is found. The lake bottom has been drained by ditches and now presents a large level tract of excellent land in which numerous springs bubble up from the rock below. It is proposed at present to develop the flow of these springs by means of a number of wells and carry the water into the city by a gravity pipe line. The water will be received at a pump well at the present station and from there distributed to the city by the present machinery. It is not certain yet whether there will be sufficient fall to enable the water to be economically conducted by gravity and it may be necessary to install a low service pumping plant at the well site; these are details to be worked out by the consulting engineer, whom it is proposed to employ.

"The water is found in the wells at a depth of about 35 feet and seems to be the same water that outcrops in the numerous excellent springs that are scattered over the 'Ridge'.

"It is not feasible to take up here the question of the adequacy of the supply, any further than to state that one well was pumped at the rate of 750,000 gallons per 24 hours which pumping only lowered the water in the well some 10 to 12 feet and did not materially affect the flow of the neighboring well and of the numerous springs. The natural flow of this well was stated to be 168,000 gallons per day, which flow begins a very few seconds after the pumping has ceased. As it is claimed that the maximum consumption of water is now about 1,000,000 gallons per day, it is very probable that a sufficient supply can be very easily developed here. Numerous samples have been collected from the neighboring springs and from the first test well and returned to the laboratory for analysis, all of which have been favorably reported on. Considering this fact and also that there is no chance whatever for local pollution there seems to be no doubt of the purity of the supply. Any contamination from the vegetable matter of the muck can easily be eliminated by carefully casing the wells to the rock beneath.

"These wells are located on the Chambers' farm, 60 acres of which have been optioned for the development of this supply. There seems to be no doubt that if Findlay properly develops this supply and that if the quantity holds out, it will have a public supply equal to any in the state, and immeasurably better than the present one from the Blanchard River.

"Samples for chemical and bacteriological examination were collected from well No. 2 and returned to the laboratory. The chemist, Mr. Horton, reported upon the same as follows:

REPORT OF EXAMINATION OF WATER FROM FINDLAY.

PARTS PER MILLION.

Source of sample.....	Well No. 2. Chambers Farm.
Number of sample.....	2253.
Color	12.
Turbidity	trace
Sediment	trace
Odor	none
Oxygen required .....	.84
N. as ammonia free .....	.008
N. as ammonia albuminoid.....	.027
N. as nitrates	5.80
N. as nitrites	none
Chlorine	1.6
Alkalinity	235.
Incrusting constituents	1.
Total solids	348.
Volatile and combustible	78.
Bacteria per c c	40.
Iron .....	.3

"The nitrates of the present sample are not as significant as is usual. The water of the locality from which this sample came shows

nitrate as found from the various samples received. In this connection we would also call attention to the low chlorine. The sample is only moderately hard—softer than many of our waters, and nearly pure organically.

“The results indicate a suitable water for a public supply.”

These reports were submitted to the State Board of Health for consideration and on February 2nd, 1903, the city waterworks board was notified that the supply had been approved at a meeting of the Board, held January 28th, 1903.

REPORT ON PROPOSED WATER SUPPLY FOR JACKSONVILLE.

Application having been made by Dr. C. von Scheele, health officer, for the approval of a source of water supply for part of Jacksonville, the engineer, Mr. Pratt, visited this village December 10, 1903, and was shown about by the mayor, health officer and members of the council, from whom he received the information upon which his report is based. The report is as follows:

“Jacksonville is a mining village of about 1,000 people located in the northern part of Athens County. The corporation is divided into two portions, Jacksonville proper containing 600 people and Redwood having 400. The proposed supply is for the former portion only. The village now depends for its water supply upon cisterns and wells; though as explained below the latter are not usually satisfactory. At the present time there is a great scarcity of both cistern and well water. There has been no epidemic traceable to poor water however.

“Jacksonville proper is located in the valley of Sunday Creek, approximately two-thirds of its inhabited portion sloping directly toward the creek and the remaining one-third toward a shallow valley, through which flows a small intermittent tributary of Sunday Creek.

“Some five years ago a ‘cave in’ occurred in the Continental Coal Company’s Mine No. 4, located under this valley which caused the surface of the ground at one place to settle about six feet. Immediately afterward a large stream of water entered the mine near the place of the ‘cave in’ and at the same time nine or ten wells in the part of the village nearest to this point suddenly ran dry while others were more or less affected. The water has been running into the mine ever since and is used by the miners for drinking purposes.

“It is proposed to build a pump well in the mine and sink an iron pipe through from the surface and pump the water to a reservoir to be built upon a neighboring hill from which it is to be supplied to the village.

"There are probably twenty-five or thirty houses within 1,000 feet of the point at which the water enters the mine and upon land sloping toward this point.

"The geological formation over the mine is as follows: clay, 10 to 15 feet; quicksand, 1 to 5 feet, then soapstone, limestone and shale, making a total depth of 110 feet over the coal.

"The flow of this underground stream as inspected in the mine appeared to be at the rate of about 100,000 gallons per day and is said to be constant. This would be ample for the present needs at least of the village.

"The only reason for questioning the desirability of the proposed source is the fact that there is connection between it and the subsoil water under the village, as shown by the draining of the wells at the time of the 'cave in.' In spite of this, however, chemical analysis shows the water to be unpolluted.

"On the other hand the samples were collected at a time when the ground was frozen and on this account a portion at least of the pollution from the village, which might in wet weather soak into the ground, was effectively cut off from reaching the porous or seamy rock underlying the village. Analysis of samples of the water collected just after a period of wet weather should be made before the Board approves the supply permanently.

"I recommend, however, that, considering the present good character of the water, the urgent need of the village for a public supply and the impracticability of securing a supply elsewhere than from the proposed source that this source be approved subject to future disapproval by the Board if the water becomes contaminated."

Samples of the water from the mine were collected by the engineer and were examined in the laboratory with the following results:

REPORT OF EXAMINATION OF WATER FROM JACKSONVILLE.
PARTS PER MILLION.

Source of sample	Mine No. 4.	Private well above mine.
Number of sample	3346.	3347.
Color	none	none
Turbidity	20.	20.
Sediment	slight	slight
Odor	none	none
Oxygen required .....	.77	1.90
N. as ammonia albuminoid.....	.042	.104
N. as ammonia free .....	.006	.006
N. as nitrites	none	.002
N. as nitrates	none	12.0
Chlorine	63.2	33.7
Alkalinity	225.	314.
Incrusting constituents	65.	291.
Total solids	571.	1443.
Loss on ignition	96.	307.
Iron .....	.2	.1
Bacteria per c c	95.	4900.
Colon bacilli present in 50 c c.....	no	

"3346—Mine No. 4 at proposed intake. The chemical and bacterial results agree in showing this water is quite free from fresh organic material, either vegetative or animal in origin. It will be noticed that the chlorides of this sample are considerably higher than those of the sample taken from the private well for comparison, but a consideration of the two analyses show that the chlorides of the mine water are largely due to mineral sources and are not to be considered as indicative of a sewage influence.

"The water is moderately hard, but it is better than quite a number of waters in use in other portions of the state, and is acceptable in this respect. The amount of iron in the sample was small and will not give rise to complaint unless it should increase considerably in amount.

"The water as shown by the analysis is a suitable water for a public supply, and it may be added that if this water comes from a mine previously worked, there has been opportunity for the washing away of any pollution by animals or miners, and the water is entirely satisfactory for use considered from a sanitary standpoint.

"3347—Private well above the mine and some 2,500 feet from it. This analysis is modified by virtue of the water being influenced by sewage sources (such for example as privy vaults or barnyards). The chlorides of this sample are due in part to sewage sources as indicated by the remainder of the analysis. Nitrates are present in considerable amount and nitrites are beginning to come. The number of bacteria is high.

"This water is to be looked upon with some suspicion as it is apt to become more seriously polluted at any time."

The question of approving a water supply for the village of Jacksonville, to be obtained from an abandoned coal mine known as Mine No. 4 of the Continental Coal Company, was submitted to the State Board of Health and on December 23, 1903, the mayor and council were notified that the Board had approved of the supply upon the condition that subsequent examinations show it to maintain its present state of purity. At a meeting of the Board, held January 20, 1904, this action was confirmed by *viva voce* vote.

REPORT ON PROPOSED WATER SUPPLY FOR JOHNSTOWN.

The board of public affairs of Johnstown having requested the State Board of Health to approve a proposed water supply for the village, the engineer, Mr. Pratt, visited Johnstown September 1, 1903, and reported as follows:

"The village of Johnstown, having a population of about 600, is about to put in a public water supply for fire protection, but desires that the quality of the water be suitable for domestic uses.

"It is intended to buy for waterworks purposes a piece of land known as the 'Kasson Lot' 132 feet square and located several hundred feet east of the main street and 200 feet west of the T. & O. C. railroad. It is well within the residence part of the corporation. On the west side there are three houses and privies within 150 feet while on the other side there are about twelve houses within 600 feet, and apparently good chances for building more within a shorter distance. A test well 188 feet deep driven through alternate strata of clay and sand to a gravel bed in which water was obtained, has been put down. No reliable pumping tests have been made to ascertain the quantity available.

"The water as shown by analysis is at present safe to use but it is probable that as the well is pumped the water will be drawn from a wider and more thickly populated area and consequently deteriorate in quality.

"In view of the above facts and also because it seems that the only reason for using the 'Kasson Lot' is to save cost of a few hundred feet of piping, I recommend that the proposed site be disapproved, and that the village be advised to locate its wells on the west side of the T. & O. C. railroad at a distance of at least 1,000 feet from the edge of the village."

Samples of the water were collected by Mr. Pratt for examination, were sent to the laboratory, and were reported upon by the chemist as follows:

REPORT OF EXAMINATION OF WATER FROM JOHNSTOWN.

PARTS PER MILLION.

Source of sample	Proposed supply well.
Number of sample	3063.
Color	18.
Turbidity	35.
Sediment	slight
Odor	none
Oxygen required	1.09
N. as ammonia albuminoid.....	.054
N. as ammonia free.....	.682
N. as nitrites	none
N. as nitrates	none
Chlorine	1.5
Alkalinity	285.
Incrusting constituents	none
Total solids	479.
Loss on ignition	108.
Iron	1.6
Bacteria per c c	11000.
Colon bacilli present	In 50 c c, no.

"The results indicate a water from deep sources. The number of bacteria is high and may come from its being a new well or from an

accidental contamination. The absence of intestinal bacteria shows the freedom of the water from sewage pollution. The high free ammonia has come from reduction, if the water is of deep origin, and is permissible though rather high. If this water should be from a shallow well the amount of free ammonia would have more significance. There has been no past pollution to speak of, for the chlorides are very low. The findings for oxygen required, albuminoid ammonia, nitrites and nitrates are satisfactory. The appearance of the water is not as good as might be desired owing to the presence of some iron. The amount at this time is not large, although apt to cause some complaint unless removed. In this case the alkalinity is a little greater than the real hardness and no scale forming matter is present, therefore the water is a suitable one for steam purposes. As regards quality, this water is classed as a usable one, the iron being the most unfavorable consideration from the analytical side."

The question of approving this supply was submitted to the State Board of Health and on October 16th, 1903, the board of public affairs was notified that the Board had voted to approve of a public water supply, to be obtained from a driven well located on the "Kasson Lot" provided that a pumping test in the presence of the engineer of the Board should show no connection between the water furnished by this well and water in surface wells of the village and that a chemical examination of a second sample should be satisfactory. Another sample of water was collected and on November 28th, 1903, the board of public affairs was notified that the second sample proving the water to be satisfactory the supply was approved.

At a meeting of the State Board of Health, held January 20th, 1904, this action was confirmed by *viva voce* vote.

REPORT ON PROPOSED ADDITION TO WATER SUPPLY OF LEIPSIC.

The village of Leipsic wishing to make an addition to their present water supply submitted a sample of water from proposed well and the information used in the following report was sent to the Board by the secretary:

"The village of Leipsic, Ohio, has made application for the approval of an additional water supply, which is to be obtained from an abandoned oil well. This well was about 1,400 feet deep and was plugged with wood, clay and stone seventy feet in thickness at a depth of 550 from the surface. The well is located in a large field some 500 feet or more from the well which is now furnishing the water supply. Application for approval was made by Mr. C. C. Switzer, secretary of the Leipsic waterworks, and he states that they are very much in need of an increased supply, and that no different water is available from that furnished by this abandoned oil well.

"Attached hereto is a copy of the chemist's report upon samples of water taken from this proposed well. Sample No. 3,206 is from the same well as sample No. 3,114; that is, it is from this abandoned oil well, which they are proposing to use. You will note that this well showed some improvement after pumping. The water would appear to be an undesirable one, but would not likely be detrimental to health. They were unable to furnish records of borings showing geological formation. If their statements are to be accepted that no better water is available, and I would say that the old supply is of much the same character as the proposed supply, it would seem to be approvable."

REPORT OF EXAMINATION OF SAMPLES OF WATER FROM LEIPSIC.

PARTS PER MILLION.

Source of sample	"Oil Well"	Waterworks well.	Drilled well on Sands property. Sept. 21, 1903. No. 3114.
Number of sample	3206.	3207.	10.
Color	trace	trace	113.
Turbidity	slight	none	considerable
Sediment	slight	very slight	strong oily
Odor	5 oil & sulphur	faint oily	9.04
Oxygen required	10.48	1.11	.138
N. as ammonia albumi- noid .....	.060	.046	.514
N. as ammonia free....	.330	.110	none
N. as nitrites	none	trace	none
N. as nitrates	none	none	65.7
Chlorine	60.7	30.3	193.
Alkalinity	209.	165.	39.
Incrusting constituents.	57.	92.	649.
Total solids	578.	670.	113.
Loss on ignition	107.	42.	2.0
Iron .....	.3	.9	300.
Bacteria per c c	50.	170.	no
Colon bacilli in 50 c c..	no	no	no
Suspended solids		67.	

"These samples were received on the 28th ult. having been collected by Mr. C. C. Switzer, secretary of waterworks, from a well furnishing the present supply (3207), and from an old oil well now proposed as an addition to the public supply. Sample No. 3,206 represents the proposed additional supply. Examination gave the above findings.

"No. 3,206—The new well, bored for oil to 1,400 feet but now plugged at 550 feet from the surface. The analysis shows that this water is not receiving any sewage pollution and is as far as that is concerned an acceptable water for an addition to the supply. However it contains a greater amount of inorganic material than the present supply, as will be seen by comparing the analyses. The water from the oil well is lower in scale forming material (incrusting constituents), but it is higher in alkalinity and in salt pollution (chlorides). While this in-

organic matter is not desirable it would not prevent here the use of this water as an additional supply. The factor that would cause most complaint with this water is its character derived from the greater depths and shown here especially in the oxygen required and the odor. This water contains sulphur and oil and would cause complaint from consumers on that account. As these are not dangerous features but rather disagreeable ones, and furthermore as they may decrease with the use of the well, it is possible that the users would put up with the disagreeable properties for a time provided it is essential that more water be obtained. The water could be used, but it has some disagreeable features.

"No. 3,207—Well for waterworks, 'Old Well.' The analysis shows a water free from organic pollution and of a usable quality in other respects. It is much the same as the trial sample (1,285) examined in August, 1900, but in some minor respects shows a slight improvement over that sample.

"No. 3,114 collected Sept. 21, 1903, was reported upon verbally as unsatisfactory under date of Sept. 28, and a second sample asked for. It is my understanding that No. 3,206 is from the same well that No. 3,114 was. The samples are quite similar, the present one showing some improvement especially in appearance, and in the findings for ammonias, iron, and suspended solids."

This matter was submitted to the Board and on November 19th, 1903, Mr. C. C. Switzer, secretary of the Leipsic waterworks, was notified that the Board approved of an additional water supply for that village, to be obtained from an abandoned oil well located some five hundred feet or more from the well now furnishing the water for the village. At a meeting of the State Board of Health, held October 15th, 1903, this action was confirmed by *viva voce* vote.

REPORT ON PROPOSED WATER SUPPLY FOR MILFORD.

The board of public affairs of Milford made application for the Board's approval of a proposed water supply for that village. Dr. Byron Stanton, member of the Board, was appointed a committee to make the necessary investigation. He reported as follows:

"Milford is situated in Miami Township, Clermont County, on the east bank of the Little Miami River and has a population of about 1,400.

"It is proposed to obtain a water supply from drilled wells located in a flat on the east side of the river above the village. The board of public affairs has an option on three acres of this flat near the center of which the wells will be located.

"One test well, 6 inches in diameter, has been drilled to a depth of 50 feet and cased to within eight feet of the bottom. It passes through clay, 8 feet; dry gravel, 20 feet; hard yellow clay, 6 inches; a stratum of clean gravel the depth of which was not determined, but which is pierced by the well to the depth of 32 feet. It is from this stratum that the water

is obtained. The well is capped to prevent surface pollution and is supplied with an eight foot strainer at the bottom. It has been pumped for eight hours without showing any appreciable diminution of the supply. It had been pumped constantly for four hours, at the rate of 300 gallons per minute, when the samples were collected that were sent to the laboratory of the Board for bacteriological and chemical examination. The water was perfectly clear, cool, palatable and free from sand.

"About 400 feet to the east of the well and on a much higher bank, composed largely of clay, are a few houses. The depth of the well and the character of overlying strata would no doubt prevent any pollution from these houses.

"About 900 feet further up the valley and on the higher bank above referred to is an abandoned cemetery in which there have been no interments for over a quarter of a century. Many of the bodies have been disinterred and all others are to be and the cemetery will be converted into a park, so no contamination from this source need be feared.

"It is proposed, if this well is approved, to put down two additional wells, or more if required, to be of the same depth and about 100 feet apart. The water will be pumped to a concrete or steel stand-pipe and distributed by gravity to the village. The estimated consumption is about 750,000 gallons and it is believed that much more than that amount can be obtained from the stratum of water-bearing gravel.

"It is recommended that the proposed supply be approved, provided, the organic ingredients and chlorine are as low as it is believed they will be found."

A sample of the water was collected and sent to the laboratory for examination. Mr. Horton, the chemist, reported upon this as follows:

REPORT OF EXAMINATION OF WATER FROM MILFORD.

PARTS PER MILLION.

	Drilled well.
Source of sample	2976.
Number of sample	trace
Color	none
Turbidity	none
Sediment	none
Odor	none
Oxygen required .....	.35
N. as ammonia albuminoid .....	.010
N. as ammonia free.....	.006
N. as nitrites	none
N. as nitrates	5.2
Chlorine	3.3
Alkalinity	263.
Incrusting constituents	23.
Total solids	361.
Loss on ignition	96.
Iron .....	.15
Bacteria per c c	140.
Colon bacilli present in 50 c c.....	no

"The findings for color, turbidity, sediment, odor, oxygen required, nitrites, and the ammonias are excellent and about as near perfect as a natural water ever shows. The bacterial results are good.

"While the chlorides are quite low, yet, with the nitrates, they stand for a slight amount of past pollution. This may have been very remote in time, and from the location of the wells must be remote in distance. The chlorides and nitrates are in no wise detrimental to the water in the amounts here shown, and as they are very much lower than those found in many a private well water claimed by its owner to be "the best water around," no objection should be raised to their presence in this water which gives such strong evidences of complete purification.

"The water is moderately high in carbonates and will consume some soap, but it is not a hard water for this state, is presumably softer than some private wells now in use, and furthermore it contains very little scale forming material which would be more objectionable for boiler purposes than the alkalinity findings.

"The analysis indicates a water of suitable quality for a public supply, and one which should give satisfaction to the consumer."

These reports were submitted to the State Board of Health and on September 3d, 1903, the village authorities were notified that the Board had voted to approve of the supply to be obtained from wells located on the east side of the river above the village.

At a meeting of the Board, held October 15th, 1903, this action was confirmed by *viva voce* vote.

REPORT ON PROPOSED WATER SUPPLY FOR MURRAY.

Application having been received from the mayor of Murray for the approval of a water supply, the engineer went there on July 13th, 1903, and after an investigation collected a sample of the water for a chemical and bacteriological analysis and submitted the following report:

"Murray is a mining village situated in the easterly part of Hocking county. There are about 1,500 inhabitants within the corporation limits; but just outside of its northerly and easterly boundaries in Ward Township, Hocking County, are 1,000 people who, with Murray proper, form a settlement of 2,500 inhabitants, all of whom will probably be furnished with water, if a public supply is introduced.

"The principal reason for constructing waterworks is for fire protection, but it is desired that the water be of a quality suitable for domestic uses. It is important for sanitary reasons, however, that a good public supply be introduced, as the dug wells upon which the people now depend are probably much polluted.

"It is proposed to construct a brick well about twelve feet in diameter, in the center of a six acre lot of land in the valley of Snow Fork

Creek a few hundred feet west of the railroad station, for the collection of ground water from the gravel stratum which underlies the clay surface of the valley. From this well the water is to be pumped to a 100,000 gallon brick reservoir located on a nearby hill at an elevation sufficient to produce a high pressure in the distributing pipes.

"The six acre lot is well protected from surface pollution on the north by Snow Fork Creek and on the east and southeast by a deep ditch. While on the west a steep hill, uncultivated and uninhabited, rises to a considerable height. The bed of the creek is ten feet below the level of the lot and the stream is said to rarely overflow.

"Extending in a northerly direction from a point in the valley seven hundred feet above the proposed well to a point about one mile above is a settlement of one hundred or more houses. There are also a few houses about four or five hundred feet in a southerly direction from the proposed location on the opposite side of the ditch.

"A test well consisting of a one and one-half inch iron pipe has been driven in the center of the lot to a depth of twenty-five feet, the material passed through being twelve feet of clay, then two feet of quicksand, then four feet of blue clay, below which was a gravel stratum. The water stands in the test well within ten feet of the surface. A well was started about one hundred feet west of the present well near the foot of the above mentioned hill, but rock was encountered at a depth of twelve feet directly below the clay. This indicates that the gravel deposit in this vicinity may not be very extensive.

"The distance of the proposed location from any considerable number of houses would make it appear possible to obtain a fairly good supply but the chemist's report shows that the water from the test well not only receives pollution from sewage, but contains an amount of iron, quite sufficient to render it useless for domestic purposes. The village should seek, for a source of supply, a location which is free from both surface and underground contamination and one which will furnish a water containing an unobjectionable amount of iron."

A chemical and bacteriological analysis showed that the water was not of a good quality and, in conference with the mayor of the village later, it was advised that they look for water elsewhere.

A new well has since been put down in a new locality. It is a driven and drilled well 82 feet deep. The soil pierced by the well is clay soil to shale, 18 feet, and the remainder is in shale and rock. There are no sources of pollution near the well. A pumping test was made which indicated that the quantity of water to be obtained would be sufficient. A

sample of the water was collected by the mayor on November 17th, 1903, and was examined in the laboratory with the following result:

REPORT OF EXAMINATION OF WATER FROM MURRAY.

PARTS PER MILLION.

Source of sample	Test well, 82 feet deep.
Number of sample	3256.
Color	8.
Turbidity	trace
Sediment	trace
Odor	none
Oxygen required	1.31
N. as ammonia albuminoid .....	.042
N. as ammonia free .....	.438
N. as nitrites	trace
N. as nitrates	none
Chlorine	25.5
Alkalinity	327.
Incrusting constituents	none
Total solids	366.
Loss on ignition	86.
Iron .....	.8
Bacteria per c c	75.
Colon bacilli present in 50 c c	no

"This sample was received on the 17th instant, from Mayor Wm. H. Hudson, having been collected by him from a driven and drilled test well, 82 feet in depth, and located in the triangle formed by the high hills, the ball ground, and the small stream of water.

"The results show a water of deep origin that is practically free from organic matter. This water contains some chlorides, derived probably from soil sources as common salt. The alkalinity would indicate a high soap consuming power, but it should be borne in mind that in this particular water, alkaline earths were present and the alkalinity is greater than the true hardness. Some iron is present, which causes a slight sediment and a little turbidity, but unless the amount of iron should increase this will be a minor consideration. The analysis indicates a water of suitable quality for a public supply."

The question of approving this source of supply was submitted to the Board and on December 9th, 1903, the mayor was notified that the State Board of Health had voted to approve of a public water supply for the village of Murray, to be obtained from a driven and drilled well, 82 feet deep, located not far from their present ball grounds.

At a meeting of the State Board of Health, held January 20th, 1904, this action was confirmed by *viva voce* vote,

REPORT ON PROPOSED CHANGES IN WATER SUPPLY FOR
OBERLIN.

The following communication from the board of public affairs of Oberlin relative to changing their public water supply was received August 22nd, 1903:

"OBERLIN, OHIO, August 21, 1903.

"To the Members of the State Board of Health of Ohio:

"GENTLEMEN:—The board of trustees of public affairs of the village of Oberlin, Ohio, herewith submits to your consideration and approval a plan for improving the water supply of this village.

"The present supply is derived from the east branch of the Vermilion River. The water is taken from the river at a point about six miles from the pumping station and is conducted in a vitrified conduit to the station. The inlet to the conduit is near the source of the river and the drainage area is used only for agricultural purposes. There is no population on this area other than would be naturally found in an open farming country. The board of trustees own and control the 106 acres immediately above the intake.

"The water has been used since 1887 for all culinary purposes and has always been satisfactory. There never has been a case of sickness in the most remote way traced to the use of the water.

"The following is the report of E. G. Horton, upon a sample of the water collected April 7, 1903, and analyzed by him:

LABORATORY OHIO STATE BOARD OF HEALTH.

COLUMBUS, April 15, 1903.

"Present supply. Report of examination of samples of water collected at Oberlin, April 7, 1903.

PARTS PER MILLION.

Source of sample	Hydrant
Number of sample	2732.
Color	32.
Turbidity	slight
Sediment	very slight
Odor	faint
Oxygen required	6.05
N. as ammonia albuminoid .....	.196
N. as ammonia free .....	.007
N. as nitrites	trace
N. as nitrates	none
Chlorine	4.0
Alkalinity	125.
Incrusting constituents	40.
Total solids	259.
Loss on ignition	
Iron .....	.8
Bacteria per c c	700.
Colon bacilli present	yes in 45 c c, not in 1 c c.

"In appearance the water is not clear, but it is not bad for a surface water. The albuminoid ammonia and oxygen required show the presence of vegetative organic matter to some extent. The number of bacteria is not bad for a surface water, while the presence of colon bacilli so sparingly has no material significance as intestinal bacteria from the domestic animals might be expected in a flowing stream like that from which this supply is derived.

"For an Ohio supply this would be classed as a soft water.

"The analysis indicates one of the better supplies derived from surface water without filtration, and one that probably does not give rise to more than passing complaint on the part of the consumer.

"The analysis indicates this water would with treatment be an excellent public supply.

"Respectfully submitted,

"(Signed) E. G. HORTON,

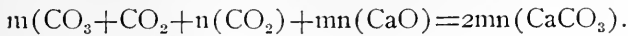
"Bacteriologist and Chemist."

"The improvements contemplated consist in filtering and softening the water. The plan is to prepare two settling basins and introduce the water into the bottom of the first basin after passing through a mixing box containing baffle boards where first lime and then soda ash is thoroughly mixed with the water. The basin will hold about 400,000 gallons. The water is then drawn from the top of this basin and introduced to the bottom of a second similar basin. It is again drawn from the top of this basin and flows to the pump well. It is then pumped to the standpipe and on its way to the town, passes through pressure filters.

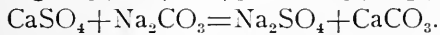
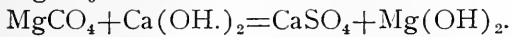
"The analysis of the water now in use as made by two filter firms is as follows:

	(Grains per U. S. Gallon.)	(Grains per U. S. Gallon.)
Calcium carbonate	7.16	6.96
Calcium sulphate.....	none	
Calcium chloride	none	
Magnesium carbonate	0.46	.97
Magnesium sulphate	4.14	3.56
Magnesium chloride	none	
Sodium sulphate	0.57	1.81
Sodium chloride	1.17	0.86
Sodium carbonate	none	
Oxides of iron and alumina.....	0.09	.16
Carbonic acid	3.40	
Silica	0.41	.76
Alkalinity	8.16	
Suspended matter	0.18	
Incrusting solids	12.43	12.41
Non-incrusting solids	1.74	
Incrusting solids per thousand gallon..	1.78	

"The chemical reaction will be as follows:



MgCO_3 follows the same rule.



The water after treatment will give the following analysis and practically all bacteria will be removed:

SiO_2 , Silica.....	.15
$\text{Al}_2\text{O}_3\text{Fe}_2\text{O}_3$.....	.10
CaCO_3 , calcium carbonate.....	1.78
MgCO_3 , magnesium carbonate.....	1.68
Na_2SO_4 , sodium sulphate.....	6.03
NaCl , sodium chloride.....	.32
Total.....	10.06
Hardness, total.....	3.68

The question of approving these changes in the public water supply of Oberlin was submitted to the State Board of Health and on September 3d, 1903, they were notified that the plans had been approved.

At a meeting of the Board, held October 15, 1903, this action was confirmed by a *viva voce* vote.

REPORT ON PROPOSED WATER SUPPLY FOR OTTAWA.

The village of Ottawa, through its consulting engineer, Mr. John P. Force, made application for the approval of the State Board of Health of a proposed water supply.

Accordingly, the engineer, Mr. R. Winthrop Pratt, visited Ottawa June 19th to make the necessary investigation. Mr. Pratt reported as follows:

"The village intends to purchase a four acre lot of land in the north-eastern part of the corporation to be reserved for waterworks purposes. This land is bounded on the north by the F. Ft. W. & W. R. R.; on the east by private land; on the south by Third Street; and on the west by Pratt Street. It is slightly higher than the land which surrounds it and is, therefore, free from surface pollution. There are at present two or three houses within a few hundred feet of the westerly boundary of the lot and more may be built within that distance, but their drainage will probably not flow toward the lot. On the north and east sides from which directions the country has a general slope there is no prospect of any buildings being erected within a considerable distance of the lot.

"It is proposed to drill four deep wells on this area at sufficient distances to avoid influencing the height of the water in one by pumping

from another. Water is to be pumped from these wells to a covered masonry reservoir of 100,000 gallons capacity, located in the immediate vicinity, from which it is to be pumped during the day directly into the mains and into a standpipe of 75,000 gallons capacity, 140 feet high, to be used for the night supply.

"Well No. 1, the first of the proposed four, has already been drilled. It is 400 feet deep and consists of an eight-inch iron casing sunk through strata of soil, gravel and boulders, cemented gravel and blue clay 87 feet to blue limestone and 6 feet into this rock; from there down an eight to six-inch hole is drilled 307 feet through the limestone making a total depth of 400 feet. The height of the water in the well is 30 feet below the surface of the ground.

"A pumping test showed that Well No. 1 can easily yield 75 gallons per minute and if as much as this or even if considerably less than this amount is obtained from the other wells, the supply of water for the village will be ample.

"The chemist's report upon the analysis of a sample of water collected during the pumping test shows it to be a usable water.

"From a strictly sanitary standpoint there is no reason why this supply cannot be safely be used. It is possible however that the amount of iron now present in the water may increase enough to cause trouble, and that the sulphur odor of which this water contains a slight amount but which is very strong in some deep well waters of this locality may not be entirely removed from this water in its passage through the reservoir."

Samples of the water were collected and sent into the laboratory for examination. Mr. Horton, the chemist, reported upon these as follows:

REPORT OF EXAMINATION OF WATER FROM OTTAWA.

PARTS PER MILLION.

Source of sample	Deep well.
Number of sample	2812.
Color	10.
Turbidity	92.
Sediment	slight
Odor	2 sulphur
Oxygen required	6.86
Ammonia albuminoid (Nitrates as) .....	.078
Ammonia free (Nitrates as) .....	.232
N. as nitrites	none
N. as nitrates	none
Chlorine	59.4
Alkalinity	159.
Incrusting constituents	41.
Total solids	618.
Loss on ignition	174.
Iron	1.1
Bacteria per c c	2900.
Colon bacilli present in 50 c c	no

"This sample was received on the 4th inst., having been collected from a deep well and sent by Mr. John P. Force. The results indicate a water from a deep well. It is comparatively free from organic matter, and furthermore it is softer than most of our ground waters although containing considerable inorganic matter. There is a little iron present which may give rise to some complaint and especially so if it should increase in amount. The number of bacteria is high, but it is inferred that this is a new well and in such case the number of bacteria does not stand for the true character of the water. Intestinal bacteria were not found **in 50 cc. of the water.** This is a usable water and the minor undesirable features may disappear with use of the well in which case the water would be satisfactory. If these features should increase the water would be that much less desirable."

The question of approving this supply was submitted to the State Board of Health and on July 10th, 1903, Mr. George D. Kinder, president of board of trustees of public affairs, was notified that the Board had voted to approve of the supply.

At a meeting of the Board, held October 15, 1903, this action was confirmed by *viva voce* vote.

REPORT ON PROPOSED WATER SUPPLY FOR SALEM.

The superintendent of the Salem Water Company, Mr. A. R. Dow, made application for the Board's approval of an additional water supply for that city, stating that their former supply had been suddenly reduced by the drilling of an oil well five miles distant. As they were short of water he asked that the matter be acted upon as soon as possible. He stated that the well had been drilled to a depth of 142 feet, passing through 90 feet of drift, six feet of rather porous yellow sand rock, and 46 feet of coarse grained white rock, that the well was located about three-fourths of a mile west of the city, and that it had a flow of probably 75,000 gallons per day. The water flows from the top of a pipe 32 feet higher than the surrounding land, is clear and softer than the supply now in use. It will flow by gravity from the well to the pumping station, having a fall of probably forty feet. There are no dwellings in the neighborhood of the well.

As the matter was urgent bottles were sent to Mr. Dow for collecting and shipping samples of this water, and he was asked to take the health officer of Salem with him and accompany the samples with an affidavit as to the facts concerning the collection of samples, location of well and its surroundings, etc.; it being customary to have all samples collected by a representative of the Board. This was done and the chemist reported upon the sample as follows:

REPORT OF EXAMINATION OF WATER FROM SALEM.

PARTS PER MILLION.

	Well No. 1.
Source of sample	2660.
Number of sample	20.
Color	trace
Turbidity	trace
Sediment	none
Odor .....	.57
Oxygen required .....	.064
N. as ammonia albuminoid .....	.114
N. as ammonia free	none
N. as nitrites	none
N. as nitrates	trace
Chlorine	242.
Alkalinity	none
Incrusting constituents	321.
Total solids	62.
Loss on ignition .....	.4
Iron	3.
Bacteria per c c	not in 40 c c.
Colon bacilli present	

"The analysis shows a 'deep' ground water of good quality and suitable for a public supply. In appearance the water is not quite clear, but this is a very small matter in view of the very good quality otherwise indicated by the analytical findings."

The question of approving an additional water supply for the city of Salem, to be obtained from drilled wells located about one-half mile southwest of the city, was submitted to the Board at its meeting held January 28th, and on February 2nd, 1903, the superintendent of the Salem Water Works Company, was notified that the Board had voted to approve of said additional supply.

REPORT ON PROPOSED WATER SUPPLY FOR SCIO.

The Scio Pure Water Company asked the Board's approval of a new water supply proposed for that village. The engineer, Mr. Flynn, visited Scio on January 29th, 1903, and in company with Mr. W. J. Cook, superintendent of the water company, investigated the supply and reported as follows:

"The Scio Pure Water Company is a reorganization of the old Scio Water Supply Company which first furnished Scio with water in 1899. The original supply from wells in the valley of Conotton Creek became unsatisfactory on account of pollution from the numerous oil wells which were not properly plugged.

"In June, 1902, the new company secured the franchise and began to prospect for water. Now four wells have been drilled one mile north

of the village in the valley of Dining Fork Creek. These wells are 8 inches in diameter and from 104 to 108 feet deep, going through from 40 to 60 feet of drift and into sandstone. They are cased to the rock, the water being found in this stratum, and they are removed from any possible source of pollution. The water rises to within 3 feet of the surface and ordinary pumping for the supply of the village has not materially lowered the level.

"The old supply has been abandoned and the new has been furnished for a few days, apparently to the satisfaction of all concerned. In order to save the wells for domestic use it is proposed to develop a second supply, for the Pennsylvania Railroad, from the waters of Dining Fork Creek. If a proper filtration plant can be installed it is desired to use this water for the supply of the village also.

"Samples were collected from both the creek and the wells, but the approval is now desired for the wells only. These samples were sent to the laboratory for examination, and Mr. Horton, the chemist, reported upon them as follows:

REPORT OF EXAMINATION OF WATER FROM SCIO.

PARTS PER MILLION.

	4 wells	Dining Fork Cr'k
Source of sample	2673.	2674.
Number of sample	8.	30. ?
Color	none	308.
Turbidity	trace	distinct
Sediment	none	faint earthy
Odor .....	.59	7.76
Oxygen required .....	.026	.362
N. as ammonia albuminoid .....	.444	.028
N. as ammonia free	none	trace
N. as nitrites	none	.80
N. as nitrates	24.8	trace
Chlorine	262.	21.
Alkalinity	none	6.
Incrusting constituents	362.	355.
Total solids	57.	55.
Loss on ignition .....	.3	2.8
Iron	7100.	\$600.
Bacteria per c c	no	yes, but not in 1
Colon bacilli present in 40 c c		c c

"Sample 2,673, from the wells, in all respects except the number of bacteria indicates this water is of deep origin and of such a quality as would make an acceptable public supply. The high number of bacteria would seem to be accidental in the present case.

"Sample 2,674, from Dining Fork Creek, is a surface water practically free from sewage and is also a soft water, although a sample taken at a lower stage of the stream would doubtless be somewhat harder. The

objections are the high amount of organic matter (chiefly vegetative), the suspended matter, and the iron, but these are removable by filtration.

"In connection with the possible filtration of this water attention is called to the low alkalinity which is so important a factor in those plants using a coagulant. The swollen condition of the streams has, no doubt, given an unusually low alkalinity in the present sample.

"With proper filtration this water should yield a very acceptable supply."

The question of approving a water supply for the village of Scio, to be obtained from drilled wells and also a supplementary supply, to be obtained from Dining Fork Creek, was submitted to the Board, and on February 13th, 1903, Mr. W. J. Cook, superintendent of the Scio Pure Water Company, was notified that the Board had voted to approve of a water supply, to be obtained from wells in valley of Dining Fork Creek, but disapproved of the use of water from said creek, except upon the condition that plans for a proper filtration plant be submitted for approval and that the water should be purified in a manner satisfactory to the State Board of Health. At a meeting of the Board, held April 8th, 1903, this action was confirmed by *viva voce* vote.

REPORT ON PROPOSED ADDITIONAL WATER SUPPLY FOR SPRINGFIELD.

Application from the board of public service having been received for the approval of an additional water supply for the city of Springfield, the engineer, Mr. Pratt, visited Springfield on June 9th, 1903, and after investigation submitted the following report:

"The first source of public water supply for Springfield consisted of a filter gallery, located on Buck Creek, about one mile above the center of the city. It was constructed in 1880, but failed after about two years' use, and a large open reservoir for the collection of ground water was built at a point just above the junction of Buck and Beaver creeks and used in connection with the old gallery until 1895.

"At this time a new pumping station, gallery and pump well were built near the reservoir, and the old sources of supply were abandoned, except that the old reservoir is now connected with Buck Creek and also with the present pump well, so that the Buck Creek water may be used directly if desired.

"Prompted by the dissatisfaction of the people of Springfield caused by the use of Buck Creek water during a dry period, the Springfield waterworks, through its secretary, made application to the State Board of Health, June 1st, 1900, for advice relative to an additional supply. Dr. Warner, as a committee, with Mr. Flynn, the late engineer of

the Board, made an investigation June 16th, 1900, and his report was submitted to the Board, which recommended increasing the supply by filtering the water of Buck Creek, or by extending the present gallery. Dr. Warner wrote to the Springfield water board stating that it would be wise for them to submit to the Board plans, which would not involve the use of the creek water direct.

"At its October meeting a few months later, the superintendent of water works, city engineer, city solicitor, and health officer, of Springfield, appeared before the State Board of Health in reference to the matter, but no plans having been prepared, no action was taken. This appears to be the last time the matter has been brought to the attention of the Board by the city of Springfield.

"The Springfield waterworks about this time appointed the late J. D. Cook, C. E., of Toledo, as consulting engineer on additional supply, and he made plans for increasing the present supply by collecting ground water contained in the large gravel beds in the valley of Buck Creek by means of an extensive system of drains, and conveying it to the present pump well. Actual work in accordance with these plans was commenced in September, 1901. At first the work was in charge of the waterworks, but later it passed under the supervision of the city engineer.

"The general plan of the completed work is as follows: Beginning at the present pump well a twenty-four inch vitrified pipe in two foot lengths is to be laid under the gravel strata upon or just below hard-pan, in which latter case the excavation of the hard-pan is to be filled with gravel. The average elevation of this pipe is twelve feet below the bed of the creek; seventeen feet below the surface of the gravel at its lower end and thirty feet at its upper end; three and one-half feet below ground water level at the lower end and twenty-five to thirty feet below it at the upper end. The joints of this pipe contain oakum and are designed to allow the ground water but not the sand to enter the pipe. At about ten points along the course of the main pipe are to be manholes at which eight inch laterals are to enter it. These laterals are of vitrified pipe and are laid upon the hard-pan but with open joints. Each manhole acts as a small settling basin where whatever sand that is in suspension in the water has a chance to settle out.

"When the system is completed the total length of the main drain will be ninety-five hundred (9,500) feet, and of the laterals three thousand (3,000) or four thousand (4,000) feet. Up to date thirty-six hundred and fifty (3,650) feet of the main drain and fifteen hundred and fifty-four (1,554) feet of the laterals have been laid. The cost to date is as follows:

Land	\$6,075 00
Labor	17,212 84
Material	17,467 88
Total	\$40,754 47

"With the exception of an occasional farm house there is said to be no source of pollution of any kind on the watershed of Buck Creek between the pump well and the settlement of New Moorefield having a population of about two hundred and fifty (250), four or five miles above.

"The yield from the drains already constructed is estimated by the chief engineer of the waterworks at two to five millions gallons daily. The average daily consumption for the city is three million five hundred thousand gallons. Samples of water were collected from the lower end of the drain of the supplementary system and from the pump well, which contains a mixture of water from the present gallery as well as from the supplementary system, and the chemist's report on the analyses of these samples shows that the water is of a suitable character for a public water supply.

"There appears to be no reason why the city of Springfield cannot increase its water supply by the above method safely and economically."

Samples of water were collected by W. H. Sieverling, city engineer, one from the pump house well and one representing the additional supply from a manhole and the result of the examination in our laboratory is as follows:

REPORT OF EXAMINATION OF WATER FROM SPRINGFIELD.

PARTS PER MILLION.

Source of sample	Pumphouse well.	Manhole No. 3.
Number of sample	2818.	2819.
Color	8.	8.
Turbidity	none	none
Sediment	none	trace
Odor	none	none
Oxygen required .....	.68	1.13
N. as ammonia albuminoid .....	.031	.055
N. as ammonia free .....	.009	.007
N. as nitrites	none	none
N. as nitrates	3.4	2.1
Chlorine	2.3	2.2
Alkalinity	252.	233.
Incrusting constituents	49.	55.
Total solids	423.	459.
Loss on ignition	112.	99.
Iron	trace	.1
Bacteria per c c.....	23.	2000. (chiefly one species.)
Colon bacilli present in 1 c c	no	no

"No. 2,818. Pump house well. This water is a good water as regards organic pollution, and while not a soft water, is softer than many of our ground waters. It is a suitable water for a public supply.

"No. 2,819. Manhole No. 3. Some of the findings would indicate this sample may have received an accidental contamination in collecting or handling, and in that connection the high number of bacteria loses its significance. The water in general has much the same character as the preceding sample. It is a usable water."

The question of approving this supply was acted upon by the Board at a meeting held June 17, 1903, and the board of public service was notified that the Board had voted to approve plans for an addition to the public water supply of the city of Springfield, which, in brief, provided for the collection of the ground water contained in large gravel beds in the valley of Buck Creek, by means of an extensive system of drains, and conducting it to the present pump station.

REPORT ON PROPOSED WATER SUPPLY FOR STRASBURG.

Dr. J. C. Schutzbach, health officer and also member of the water-works board of Strasburg, made application for the approval of the State Board of Health of a water supply that village was proposing to construct. Accordingly the engineer, Mr. R. Winthrop Pratt, visited Strasburg, June 23rd, 1903, to make the necessary investigation. Mr. Pratt reported as follows:

"It was found that complete plans had been made in February, 1903, by Davis & Humphrey, civil engineers, and that the village expected to begin actual work at once.

"The village of Strasburg is situated in the central eastern part of the state in the valley of Sugar Creek, a tributary of the Tuscarawas River. The population at present is 800 and the conditions seem favorable for substantial growth in the future. The chief reason for constructing water-works at present is to obtain fire protection, but it is desired that the water be of a character suitable for domestic uses.

"It is proposed to purchase about one-half acre of ground on the easterly side of and adjoining the B. & O. R. R. about two hundred feet north of the railroad station, and to obtain water, by means of one or more driven wells, from the gravel strata which underlie the country for miles around. The water is to be drawn from the wells by means of a pump located in the electric light station nearby and forced to a covered brick reservoir, thirty feet in diameter and holding 77,000 gallons, to be built upon a hill just east of Sugar Creek. The proposed site for the reservoir is at a point one-half mile east of the village and one hundred and eighty-five feet above it.

"The built up portion of the village extends about a mile in a northerly and southerly direction, but is only 700 to 800 feet wide. It covers the westerly part of a plain which is bounded on the east by Sugar Creek and on the west by a sharp bluff twenty feet high, at the top of which is a plateau extending a mile or more east. The foot of the bluff forms the west boundary of the village.

"The land to be taken for water supply purposes is but 300 feet from the most easterly houses of the village, and wells driven upon this land although protected from surface pollution by the four foot stratum of clay which forms the surface of the land in this vicinity would probably

be fed by ground water which had passed under the village in its course towards the creek. The houses of the village nearly all have uncemented privies and cesspools and although the quantity of filth reaching the ground water may not at present cause serious pollution, it is probable that as the village grows and the ground becomes more and more impregnated with sewage that the water will deteriorate in character and become unsafe for use. The reason for choosing this location was simply on account of its proximity to the electric light station where the pump is to be placed.

"As shown by the chemist's report, the analysis of a sample of water from a test well on the proposed land, 35 feet deep, in which the water stood 10 feet below the surface of the ground, indicates some pollution in comparison with water from a well 25 feet deep located on the west side of the village at the foot of the bluff.

"The quantity of ground water available in this vicinity judging from the extent and character of the watershed is quite sufficient to supply Strasburg for a long time in the future.

"The above mentioned plateau just west of and 20 feet above the town affords at a slightly greater expense a safe location for a source of water supply for the village and it would be much better to obtain a supply from wells driven in this area instead of from wells in the location proposed."

Samples of the water were collected by Mr. Pratt and sent in to the laboratory for examination. Mr. Horton, the chemist, reported upon these as follows:

REPORT OF EXAMINATION OF WATER FROM STRASBURG.

PARTS PER MILLION.

	Test well.	Private well.
Source of sample	2338.	2839.
Number of sample	trace	trace
Color	none	none
Turbidity	mere trace	none
Sediment	none	none
Odor	none	none
Oxygen required .....	.31	.39
N. as ammonia albuminoid .....	.036	.029
N. as ammonia free .....	.040	.014
N. as nitrites	none	none
N. as nitrates	3.4	1.4
Chlorine	2.4	1.6
Alkalinity	125.	138.
Incrusting constituents	36.	23.
Total solids	225.	239.
Loss on ignition	61.	41.
Iron .....	.15	trace
Bacteria per c c	800.	no bacterial s'ple
Colon bacilli in 50 c c	no	

"No. 2,839. Private well. No bacterial sample from this well was taken, but the chemical findings show a very satisfactory water to use for domestic purposes and also for boiler purposes.

"No. 2,838. Test well. The bacterial count is of little value as the samples were two days in transit. The number of bacteria is not bad for a new well. The findings indicative of organic pollution in the chemical analysis are all very low, showing the absence of organic matter. The sample is softer than most of our ground waters, and the scale forming material is quite low, thus indicating a desirable water for steam purposes. It will be noticed that while the chlorides are low yet nitrates are present, and what is more to the point than the presence of these in such small quantities is their increase over the findings in the private well. In neither case is the amount as yet serious, but the increase in the test well over the private well indicates a greater influence from pollution (now purified) and the question arises as to what extent will that pollution continue, and in time perhaps fail to receive a proper purification. At present the water is safely usable, and would make a wholesome and acceptable public supply."

The question of approving a water supply for the village of Strasburg, to be obtained from driven wells in the easterly part of the village and north of the railway station, was submitted to the State Board of Health and they voted to disapprove of said supply on the ground that the water might become contaminated from the sub-surface flow, and it was recommended that they go to the west of the village and there get a supply which was available, a chemical analysis from a private well showing that this water was better than that obtained from the test well in the easterly part of the village. The authorities of Strasburg put down a test well at the point suggested by the engineer and a sample of the water was submitted to the chemist with the following result:

REPORT OF EXAMINATION OF WATER FROM STRASBURG.

PARTS PER MILLION.

Source of sample	New test well on plateau.
Number of sample	2939.
Color	10.
Turbidity	24.
Sediment	considerable
Odor	faint
Oxygen required	1.46
N. as ammonia albuminoid .....	.072
N. as ammonia free .....	.009
N. as nitrites	trace
N. as nitrates	3.2
Chlorine	3.5
Alkalinity	174.
Incrusting constituents	112.
Total solids	274.
Loss on ignition	
Iron	3.5
Bacteria per c c	850.
Colon bacilli present in 50 c c.....	no

"This sample was received on the 4th of August, 1903, from Dr. J. C. Schutzbach having been collected by him assisted by Mr. Edwin R. Davis. This sample represented the water from the second test well.

"This is a subsurface water relatively free from organic matter. The number of bacteria is not high for a new well, and intestinal forms were not present. The chlorides are low, but with the nitrates would indicate a slight previous pollution of the water from some source, but the other findings indicate the purification at this time is efficient. The water in its present state, as far as organic pollution, would be suitable for a public supply. The water is moderately hard and has some scale forming material which is not desirable in a boiler water. (See incrusting constituents).

"The worst objection to this water is the amount of iron it contains. This iron causes the turbidity and would lead to much complaint on the part of consumers if opportunity for the removal of it is not afforded.

"With the iron removed this water would be suitable for a public supply, although not a soft water."

This matter was again submitted to the Board with the statement that the well had been pumped but a short time prior to the collection of the samples and that the engineer thought in all likelihood the water of the second well would be after pumping of the same character as the water of the private well previously examined. He also stated that the location of the second well was such as to render it free from any danger of pollution. The Board voted to approve of this second supply and the waterworks board was notified to this effect on August 29th, 1903.

Subsequently the mayor and clerk of the village appeared at the office to urge that they be allowed to use the water from the source first submitted to the Board, stating that they had issued all the bonds possible under the circumstances and could not go to the extra expense at this time of locating wells farther away from the village. They asked to be allowed to use this supply for a period of two years, at the end of which time, if the Board deemed it necessary, they would establish new wells. They further promised that the supply would not be used for domestic purposes. They also stated that they had built a reservoir and much of their piping was laid and they claimed the entire work must stop unless this temporary approval was given.

The question was submitted to the Board and it was voted to allow the use of the first supply for a period of two years, provided it would not be used for domestic purposes and that at the end of two years they would establish new wells if deemed necessary by the State Board of Health, and the mayor of the village was notified to this effect on September 19th, 1903. At a meeting of the State Board of Health, held October 15th, 1903, this action was confirmed by *viva voce* vote.

REPORT ON AN IMPROVED WATER SUPPLY FOR TOLEDO.

At a meeting of the State Board of Health, held January 28th, 1903, Mr. Thomas R. Cook, superintendent of the waterworks of Toledo, and Mr. Wm. G. Clark, a member of an engineering commission appointed to report upon an improved water supply for the city of Toledo, presented plans and specifications for a new water supply and the report of the commission, which is in part as follows:

"TOLEDO, OHIO, Dec. 20th, 1902.

"To the Honorable Trustees of Water Works, Toledo, Ohio:

"GENTLEMEN:—The undersigned having been appointed by you as an engineering commission, the following letter, clearly setting forth the objects for which the commission was appointed was received:

WATERWORKS DEPARTMENT,
CITY OF TOLEDO."

"G. H. BENZENBERG, }
"ALLEN HAZEN, } Engineering Commission.
"W. G. CLARK, }

"GENTLEMEN:—The question which you are called upon to determine in connection with your investigation and study here is the best method of securing for this rapidly growing city an ample supply of clear, pure and wholesome water for domestic, manufacturing and municipal purposes.

"In your study of the subject you are to take into consideration all the schemes that have been proposed here and any others that may suggest themselves to you, with a view of meeting the requirements of this city for, say the next forty years. If some method should present itself which would be satisfactory for a limited time, say fifteen or twenty years, which possessed considerable economical advantages against a more permanent solution, we wish you to include same in your report together with your recommendations for the immediate and future needs of the city, and the probable cost of each.

"All information heretofore gathered will be submitted to you and whatever work, information or tests you may require to assist you in your investigation will be furnished upon application to the Board.

(Signed) "W. A. KUHLMAN, *President.*

"HENRY KELLER,

"W. T. DAVIES,

"Trustees."

MAUMEE RIVER.

"The Maumee River is the present source of your supply. As heretofore shown it is in its present raw state a most unsatisfactory supply.

Purification works can be established, however, which will improve its quality so as to render it entirely satisfactory.

"The water of the Maumee is naturally hard, and it also contains a considerable amount of saline matter, probably due to the discharges from gas and oil wells. The hardness renders the water less desirable for washing, boiler and industrial purposes than a softer water. The saline matters from the wells have but little influence in these respects.

"The water of the Maumee is polluted by sewage and by various mineral matters from oil and gas wells, and it also carries a large amount of suspended matter, washed principally from the soil of its drainage area. The most important points of sewage pollution are as follows:

"POLLUTION OF TOWNS ON DRAINAGE AREA WITH MORE THAN 4,000 INHABITANTS IN 1900.

Drainage area of watershed 6431 square miles.

Place.	Approximate distance above present Toledo intake, miles.	Population.	
		1890.	1900.
Defiance	54	7,694	7,579
Van Wert	89	5,512	6,422
Delphos	90	4,516	4,517
Lima	112	15,981	21,723
Fort Wayne, Ind.	112	35,393	45,115
Findlay	121	18,553	17,613
Decatur, Ind.	131	3,142	4,142
St. Mary's	182	3,000	5,359
Total population in the above towns		93,791	112,470
Rural population in addition..		346,839	356,165
Total population on watershed		440,630	468,635
Urban population per sq. mile.		15	18
Rural population per sq. mile.		54	55
Total population per sq. mile..		69	73

"In addition to the cities above mentioned there are a number of villages included in the rural population in the above table, which, because of their nearness to the waterworks intake, deserve special mention. The most important of these are:

Place.	Approximate distance above present Toledo intake, miles.	Population.	
		1890.	1900.
Maumee	6	1,645	1,850
Perrysburg	6	1,747	1,766
Napoleon	37	2,764	3,639

"In addition to these the city of Toledo discharges its sewage into the Maumee River, and the conditions of the river currents heretofore described are such that some of the sewage may at times reach the present intake and thus constitute one of the most dangerous sources of pollution to the water as now taken.

"Observations of the turbidity of the water of the Maumee were taken at your pumping station before the beginning of our investigation at the request of the Ohio State Board of Health. More recently they have also been taken at certain additional points at our request. These turbidities have been taken by the wire method and the results reduced to the United States Geological Survey standard.

"The average monthly turbidities of the river water at your present intake, together with the turbidities of the river water at Maumee and of the canal water taken for comparison, as far as the records are available, are as follows:

Month.	Average turbidity of water at present intake.	Average turbidity of river water at Maumee.	Average turbidity of Canal water.
May	63		
June	104		
July	117		
August	59		110
September	115		151
October	108	70	81
November	70		

"A copy of the records in detail is appended hereto. The turbidity has fluctuated rather slowly and has been surprisingly high for the summer and fall months for a river of the size and character of the Maumee. The data give no indication of the turbidities that might be expected during the spring floods. At first thought the high summer turbidities would indicate a very high spring turbidity; but further consideration leads us to doubt whether this is the case.

"The high summer turbidity seems to be accounted for as follows: the river above the intake for a long distance, consists of a series of pools of large capacity. Directly above the pumping station the channel is large, and water in it stands at lake level, and during the dry periods the flow in it is very slight. The late J. D. Cook, in his report to the water board, dated January 12, 1886, stated that the capacity of the pool formed by the Providence dam (which is the first dam above the waterworks) contained six and one-half billion gallons, equal to many days flow of the river at low stages. Above the Providence dam we understand that there are other pools of large size. The summer rains wash the cultivated soil and this run-off makes the river water very turbid. In a river unobstructed by dams this turbid water flows away in a very short time and the water flowing thereafter, until the next turbid period, is comparatively clear. With the Maumee, however, the summer floods only serve to displace what water may be in the pools with their own. The flows between floods are small in comparison with the capacity of the pools, and the turbid water remains in the pools. Some of the turbidity is removed by sedimentation, but the finer part of it remains, and keeps the general low water turbidity far above what it would be in a stream having a continuously rapid flow.

"The high summer turbidity, therefore, results from the peculiar conditions on the Maumee and cannot be taken as an indication as a probable very high turbidity during spring floods.

"It should be noted in this connection that the rainfall during the period covered by our investigation has been much above the average; and it is not unlikely that the turbidities also have been greater than usual.

"Concerning the amount and duration of turbidity in spring floods we have no reliable data, and we have been forced to draw upon our knowledge of the character of other streams in more or less similar territory, this being the only expedient which allowed us to report upon the problem without waiting to observe actual conditions during such periods.

"We regard it as most important that daily observations of turbidities should be continued so that a full record of the condition of the water at all periods of the year may be available.

"The turbidity of the water is such as to make it most objectionable as a public water supply and the pollution which it receives from various

sources is such as to make it very likely that a considerable amount of sickness and death is caused by its use.

"If the Maumee River is to be continued as a source of supply, it must be purified. It is quite possible to construct purification works which will produce a pure and wholesome water from it.

"For the treatment of the river water we should prefer filters of the same kind as those suggested for the purification of the lake water if they could be used with satisfactory results at all times, but we do not consider this probable.

"When a water containing more than a certain amount of suspended matter is applied to a sand filter, it clogs up the pores so rapidly that it has to be cleaned frequently and the cost of the process is unduly increased; and with fine clayey turbidity some of the turbidity may pass entirely through the filter and appear in the effluent.

"The water of the Maumee River during the period covered by the records at our disposal has not contained turbidity in such amounts as usually interferes with the operation of sand filters, but it is quite certain that the water of spring floods is worse in character than any which we have seen; and it appears probable that such water may be so turbid that it cannot be well purified by sand filters without preliminary treatment.

"The preliminary treatment required would best consist of the addition to the water of the coagulant, followed by storage in reservoirs for a time sufficient to allow coagulation and partial sedimentation to take place.

"With water so treated rapid or mechanical filters would give a quite satisfactory effluent, and the cost of the plant would be considerably less than the cost of a corresponding plant for sand filters, with auxiliary coagulation and sedimentation.

"We have, therefore, based our estimates of the cost of treatment of the Maumee water upon a plant of this description.

"The plant which we consider most suitable involves the principles used in the large number of mechanical filter plants in use in this country, but with the substitution of masonry construction as has been done in a few recent plants.

"The water would pass through the filters at a rate about forty times as great as is used in sand filters, and at this rate it is essential for the success of the process that the water should be coagulated before it is delivered to the filters. That is to say, a chemical must be added to the water which decomposes, forming a flocculent gelatinous precipitate, which surrounds and draws the fine suspended particles together into aggregates which can be removed much more readily than the individual particles.

"The efficiency of the system depends upon the faithful and intelligent application of the chemical, and this is to some extent an objection to its use.

"Its principal advantage consists in the fact that with the addition of sufficient coagulant, waters can be purified which carry so much suspended matter that they are not capable of economical and adequate purification by sand filters.

"The works for the treatment of the river water by this method would involve building a new intake at some point which should be some distance up stream from the present intake, and the construction of a low lift pumping station which will pump the water so obtained to the purification works. On entering the purification works the water would first be mixed with the coagulant which would probably be a solution of sulphate of alumina. The water would then pass to coagulating basins of sufficient capacity to allow the chemical reactions to take place and to allow a considerable part of the precipitate formed by these reactions and the sediment in the water to be deposited. From the coagulating basins the water would pass to the filters. The filters would consist of sand layers in masonry structures in units not exceeding 400 square feet each. The water would pass downward through the sand and be collected by a system of underdrainage which would carry it off through suitable controlling apparatus. The sand in the filter would be cleaned by washing it from time to time with an upward current of filtered water. During the washing, it would be agitated probably by passing compressed air through it distributed by a suitable pipe system underneath. From the filters the water would pass to a clear water reservoir, and thence by gravity to the present pumping station.

"The most suitable site that we have been able to find along the river front for the location of the purification works is on the low ground now occupied by the golf course of the Country Club. The grounds are sufficient in area to permit of the location of the pumping station and the entire works at the lowest possible elevations necessary to protect the plant against floods and to permit of the water being pumped at a minimum lift and deliver the same through the works by gravity to the present pumping station. Nearly the entire area of the low ground would be required to accommodate the purification works necessary to supply the amount of water which we estimate would be required by 1940. If this ground could be secured it would be the most desirable site for the construction of such works. In case it should be found to be impossible to secure this site, it would become necessary to locate the purification works at some other point. This low ground possesses such great advantages for the low lift pumping station that this part of the plant should be placed here, even though the other parts, which require much more room, should be placed elsewhere. This could be done at the north end of the grounds without interfering in any way with the golf course. The rest of the plant, that is, the coagulating basins, filters, and pure water reservoir, could be located upon the top of the bluff across the

road, either directly opposite the proposed pumping station, or at any point between this site and Delaware Creek, and parts of the plant could perhaps be located with advantage in the valley of Delaware Creek itself. Several sites in this general neighborhood are about equally available and the choice would depend somewhat upon the arrangements which could be made for securing the lands.

"The water secured in this way with properly constructed and operated works would be ample in quantity and pure and wholesome in quality. It would be just as hard as the present river supply, but a small quantity of the temporary hardness would be changed by the chemical treatment to a permanent hardness, or, as it is sometimes called, to incrusting constituents. This change is effected by a part of the coagulant which remains in the water and changes some of the lime from carbonate to sulphate. Otherwise, the whole of the coagulant applied to the water would be removed and no part of it would be left which would be in any way injurious to health.

"In summing up the relative merits of the various schemes which have been considered by us, we find that the various ground water sources of supply are inadequate to furnish the required volume of pure water and in some cases would not, without special treatment, yield a water of satisfactory quality. The only ground water source that would yield a water of very high character are the sand beds west of the city, but the cost of securing the water-rights of so vast an area of land and of securing the water by a thorough system of deep laid drains, prohibits the favorable consideration of this source in the absence of thorough information as to area, character and depth of the sand beds and the quantity of water which could be obtained from them. Among the surface water supplies the lake water and the Maumee River water, after proper treatments, present the most favorable characteristics for furnishing the city with an adequate supply of pure and wholesome water. Either supply will have to be filtered and after filtration be protected from sunlight.

"In regard to the relative qualities of the two waters treated in these ways, it is certain that both waters would be good and satisfactory, but such difference as there is, is in favor of the lake supply.

"Both waters would be clear and colorless, and both would be sufficiently free from the effects of sewage pollution to be satisfactory from a hygienic standpoint.

"The most important difference between the waters is the matter of hardness. The water of Lake Erie, as shown by numerous analyses, compiled by us from various sources, is equivalent to about 100 parts per million of calcium carbonate, and practically all of this is in the form of carbonates and hardly any of it in the form of sulphates, or, as commonly called, incrusting constituents.

"The average hardness of the Maumee water cannot be so readily determined. All of the analyses at our disposal have been made during the summer and fall months, when the flows are comparatively small, and the hardness above the annual average. A series of samples taken from July to November, 1898, by the State Board of Health, showed an average hardness of the river water equivalent to about 170 parts of calcium carbonate per million, and of this about 30 parts were in the form of incrusting constituents. The analyses made by the State Board of Health at our request have on an average shown the water materially harder than this. On the other hand, the lower hardness of the winter and spring months would tend to reduce the average.

"In regard to their relative cost, taking into account both the expense of construction and operation, the advantage lies with the Maumee River scheme. The estimated cost of construction to meet the requirements up to 1920 on the latter project is \$773,190.00—while that on the lake project along the southern route is \$2,173,754.00, and that along the northern is \$2,483,923.00, of which latter amount however \$431,200.00 are not chargeable to the pure water supply problem. Taking into consideration both the cost of operation and the interest and sinking fund charges on the cost of construction due to the introduction of a pure water supply, such cost of the Maumee supply proves to be very much lower than that of the lake supply during the entire period to 1940, notwithstanding the relative low cost of operation in connection with the lake supply.

"The Maumee River supply has the further great advantage of extreme low cost of installation as compared with every other available scheme, which places its construction unquestionably within the reach of the city, and of its water department.

RECOMMENDATION.

"Upon a careful consideration of all questions bearing upon the proposed improved water supply for this city your commission recommend that the Maumee River be continued as the source of supply, that the water be taken from the main channel in the river nearly opposite the house of the Country Club and that for that purpose and for the location of the necessary purification works an effort be made to secure the golf course of the Country Club. Should it not be possible to secure said property, then we recommend that so much of the low ground north of the golf course be secured as may be necessary for a low lift pumping station and a roadway from there to Broadway and about 25 acres of land located anywhere along the west side of Broadway between a point west of the above proposed pumping station site and Delaware Creek.

"We further recommend that upon these sites a low lift pumping station and a suitable purification plant with clear water reservoir suitably equipped and in conformity with the requirements as set forth in the above report as necessary for the next fifteen or twenty years, be erected and properly connected with each other, and the main pumping station as soon as possible. These works can thereafter be enlarged as the increased consumption may make it necessary, and the entire works should be designed in a comprehensive manner, so as to permit such extension without causing any disarrangement of any of its existing parts.

"We further recommend that if at any time it should become possible for the city to secure the right to use water from the Miami and Erie canal for a period of years, in quantity sufficient to supply the consumption, a suitable connection should be made between the canal and the coagulation basins and that the supply be taken from the canal, and that the necessary betterments along the canal, as indicated in our report, be made. The reduction in cost of operation, will amount to about \$2 per million gallons drawn in this way.

"We further recommend that such purification plant be thereupon placed in charge of a competent and experienced person to operate it and we are satisfied that the purified Maumee River water will prove to be an ample supply of pure and wholesome water.

"Respectfully submitted,

(Signed) "G. H. BENZENBERG,

"ALLEN HAZEN,

"WM. G. CLARK,

"Engineering Commission."

APPENDIX.

TOLEDO, OHIO, RAINFALL RECORD.

Year.	Jan.	Feb.	Mch.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Annual.
1871	1.65	2.50	2.40	2.98	1.92	4.36	3.33	4.30	0.56	0.78	4.67	1.93	31.38
1872	1.20	1.10	1.68	1.90	3.97	2.96	5.76	1.16	3.38	1.45	0.78	2.22	27.56
1873	3.63	1.16	2.51	4.39	2.67	2.32	3.41	2.26	2.37	3.30	2.18	5.32	35.52
1874	3.52	2.78	1.41	3.14	1.61	4.06	2.09	2.43	0.80	0.35	2.99	0.64	25.32
1875	1.67	0.80	1.21	0.92	3.12	3.70	1.31	5.60	2.36	2.54	2.23	2.57	28.03
1876	1.76	2.03	4.10	0.55	3.21	3.58	4.36	2.95	4.36	2.61	2.07	2.97	34.55
1877	1.88	0.08	5.89	2.55	0.65	5.11	0.99	5.85	1.06	4.62	4.88	1.61	35.17
1878	3.47	1.59	1.05	2.29	5.24	2.01	5.35	1.92	2.48	2.52	2.04	2.71	32.67
1879	0.86	1.21	1.42	1.44	2.88	3.24	3.45	1.84	4.55	0.62	4.60	4.16	30.27
1880	3.08	0.99	2.15	5.01	3.74	2.91	6.22	4.65	1.23	3.31	1.74	0.69	35.72
1881	0.54	4.28	1.90	1.76	0.45	7.36	5.45	0.88	5.33	8.49	4.74	4.73	45.91
1882	1.57	2.40	3.02	1.66	4.99	4.51	3.04	3.73	2.08	2.01	2.72	1.30	33.03
1883	1.77	4.22	0.78	1.57	5.69	2.99	4.26	1.51	2.78	3.68	3.03	1.90	34.24
1884	2.61	3.03	2.09	1.57	4.71	2.70	3.66	1.48	1.02	2.14	1.39	2.03	28.43
1885	3.12	0.61	0.63	2.41	5.11	3.36	2.49	3.60	2.17	3.70	3.10	2.89	33.19
1886	2.79	1.32	2.28	2.08	4.50	2.69	0.59	3.13	6.17	1.60	2.77	2.78	32.70
1887	2.21	6.84	1.12	1.57	1.46	3.26	3.13	1.81	3.37	1.82	2.64	2.78	32.01
1888	2.18	0.75	3.63	0.86	3.26	3.69	2.92	1.97	0.68	1.64	3.02	1.26	25.86
1889	3.39	0.97	1.87	1.32	3.93	3.26	1.14	1.59	0.52	0.84	2.28	2.62	21.84
1890	1.08	3.08	2.27	1.89	0.79	3.39	3.44	1.91	0.84	2.47	4.47	1.49	36.70
1891	0.90	2.12	3.37	2.47	7.42	2.00	1.36	1.45	0.94	3.49	2.49	3.10	23.81
1892	1.05	2.34	1.18	3.17	1.24	2.00	0.42	0.60	2.50	1.69	1.04	1.50	21.34
1893	1.48	1.92	1.26	1.81	5.36	1.76	0.42	3.75	1.11	0.97	5.03	4.23	25.31
1894	2.16	0.34	0.91	2.02	2.30	1.24	1.25	3.66	4.09	1.20	1.71	1.17	33.10
1895	1.19	2.44	2.51	3.30	2.22	2.96	6.65	3.66	1.22	0.75	5.41	1.30	30.35
1896	1.75	1.10	3.25	2.54	3.28	4.07	3.73	1.95	1.81	2.81	2.21	1.99	28.10
1897	2.96	1.65	3.23	1.51	3.02	1.79	3.30	0.86	2.67	1.50	2.14	2.31	27.06
1898	1.97	1.91	3.93	0.92	5.55	1.03	2.27	0.82	0.82	2.25	2.07	0.78	29.58
1899	0.73	4.42	1.57	2.73	2.48	3.41	5.43	3.91	0.87	1.06	1.25	3.53	26.29
1900	1.38	1.13	1.94	2.37	2.85	3.32	2.68	1.29	6.51	.....	.....	.....	27.68
1901	0.72	0.62	2.76	0.86	4.72	6.19	4.01	1.29	77.21	.....	.....	.....	973.98
Sums	61.77	64.69	70.88	69.61	108.38	108.30	102.28	82.94	77.21	70.50	86.83	70.74	

Means[1.93|2.02|2.21|2.18|3.39|3.38|3.19|2.59|2.41|2.27|2.80|2.28|30.65]

ANALYSIS OF WATER FROM TOLEDO

By Chas. F. Chandler, Ph. D., President of New York Board of Health.

Solids contained in one U. S. Gallon of 231 cubic inches.	Maumee Riv- er unfiltered May 13, 1881.	Maumee Riv- er filtered.
Chloride of sodium	0.2818 grains	0.2403 grains.
Sulphate of potash.....	0.6373 "	0.4031 "
Sulphate of lime	0.2354 "	0.8449 "
Carbonate of lime.....	3.1280 "	3.2421 "
Carbonate of magnesia.....	1.1266 "	0.9061 "
Oxide of iron and alumina.....	0.1749 "	0.0583 "
Silica.....	0.5686 "	0.4228 "
Organic and volatile matter.....	0.2916 "	0.2916 "
Total solids.....	6.4442 "	6.4092 "

MAUMEE RIVER.—Hardness equivalent to 4.10 grains carbonate of lime.

No. 2377.

TOLEDO, OHIO, Sept. 19. 1896.

Deep Well.	Parts in 100,000
Chlorine as chlorides.....	1.19
Free ammonia.....	.0525
Albuminoid ammonia.....	.024
Solids.....	59.
Surface Well.	
Chlorine as chlorides	1.19
Free ammonia.....	.0305
Albuminoid ammonia.....	.0142
Solids.....	62.

No. 2440.

Estimation of solids in sample of water drawn from first well drilled on island.

Total solids 87, parts in 100,000.

G. A. KIRCHMAIER, Ph. G.

TOLEDO, OHIO, Nov. 15, 1897.

Toledo, O., November 15, 1897.

Toledo Waterworks Co.,

Gentlemen:—The following report of the two samples of water submitted to me for examination are as follows: Sample marked October 21, 1897, 8 A. M. 12 hours, contains in 100,000 parts

Chlorine as chlorides.....	2.1
Free ammonia.....	.007
Albuminoid ammonia.....	.0191
Total solids.....	68.
Sample marked Oct. 22, 8 A. M. 36 hours.	
Chlorine as chlorides.....	2.21
Free ammonia.....	.0068
Albuminoid ammonia.....	.0167
Total solids.....	65.

"Knowing the source of the waters they will be classified as usable waters. The per cent. of solids is rather high, but will gradually diminish when once the supply is properly drawn, the condition under which the water was collected does not do justice to the water and in my opinion the solids and general condition of the water will be greatly improved by proper filtration.

[Signed]

G. A. KIRCHMAIER.

CHEMICAL ANALYSIS OF WATER FROM MAUMEE RIVER AT TOLEDO WATERWORKS.

OHIO STATE BOARD OF HEALTH LABORATORY, 1892.

PARTS PER MILLION.

Date.	Color Plat-Cobalt.	Turbidity U. S. G.	Odor.	Total Solids.	Loss on Igni- tion.	Nitrogen as				Chlorine.	Alkalinity.	Oxygen Required.	Incrusting Constituents.
						Free Ammonia.	Albuminoid Ammonia.	Nitrites.	Nitrates.				
May													
3	29	35	3 v	505	178	.104	.280	.016	2.00	65.5	141	7.50	79
4	29	31	2 v	509	180	.088	.276	.016	1.80	65.4	140	7.60	91
5	30	56	2 v	529	178	.078	.312	.016	1.80	66.3	139	7.35	90
6	27	48	2 v	535	189	.046	.334	.016	1.80	76.7	223	7.76	81
7	...	56	2 v	542	191	...	...	...	...	69.0	159	...	77
8	...	39	...	595	212	...	...	...	...	87.5	172	...	77
9	32	48	2 v.e	579	213	.078	.302	.020	1.70	84.3	167	8.62	91
10	30	64	2 v	573	211	.056	.316	.020	1.70	85.2	165	8.22	93
11	28	48	...	584	215	.106	.332	.026	2.20	90.1	163	7.44	93
12	31	39	2 v	578	211	.088	.320	.026	2.40	95.7	161	7.88	91
17	34	52	3 v	556	...	.134	.324	.030	2.40	83.7	156	8.79	89
18	31	52	3 v	566	...	.140	.384	.026	2.20	88.5	155	9.08	77
June													
10	60	98	3 v.e	470	...	.108	.402	.040	2.60	34.6	138	13.41	64
10	60	...	3 v.e	473	...	.061	.370	.024	2.90	34.5	149	13.94	60
14	50	123	3 v.e	420	...	.044	.290	high	2.80	19.8	128	11.49	51
16	40	149	3 v.e	415	...	.052	.342	high	2.70	15.3	117	11.92	38
25	40	98	3 e	369	...	.056	.288	.050	2.20	11.3	141	12.00	50
26	40	98	3 e	391	...	.060	.446	.012	2.00	12.7	142	11.11	50
29	80	108	3 v	379	...	.122	.442	.100	3.00	12.0	137	12.73	47
30	50	149	3 v	511	...	.068	.562	T	3.50	63.0	125	13.18	72
July													
1	90	98	3 e	524	...	.132	.540	.064	3.20	54.6	131	12.00	59
2	110	386	4 e.v	740	...	.050	.724	.080	3.60	23.9	96	17.92	59
Aug.													
2	50	43	2 e	586	...	.118	.426	.020	0.40	91.3	186	10.02	164
8	40	52	3 e	511	...	.160	.352	.040	0.30	68.6	168	9.09	41
9	43	60	3 e.v	497	...	.130	.442	.034	0.30	63.2	168	9.86	40
Sep.													
12	35	77	3 v	...	...	.074	.342	.040	none	75.5	155	9.58	none
13	30	72	3 v	...	...	.044	.312	none	none	82.8	151	9.64	48
24	40	89	3 e	...	...	.208	.356	.050	none	82.5	153	10.10	62
25	35	81	e.	...	...	.068	.342	none	none	93.6	147	9.11	65
28	30	386	3 e	...	...	.032	.416	.040	1.80	37.0	102	15.08	47
30	35	205	3 e	...	...	.040	.394	.040	1.80	22.4	107	13.39	...

CHEMICAL ANALYSIS OF WATER FROM MAUMEE RIVER AT PUMPING STATION.

OHIO STATE BOARD OF HEALTH LABORATORY, 1902.

PARTS PER MILLION.

	Nov. 10	Nov. 14	Nov. 19	Nov. 27	Dec.
Color.....	30	28	33	55	4
Sediment.....			slight		
Odor.....	3-E & V	3-E	3-E & V	3-V & P	
Total solids.....	423	454	569	499	506
Loss on ignition.....	159	136	200	164	
Nitrogen as free ammonia.....	0.034	0.058	0.034	0.048	
Nitrogen as albuminoid ammonia..	0.360	0.354	0.248	0.248	
Nitrogen as nitrites.....	0.003	trace	0.002	0.004	
Nitrogen as nitrates.....	trace	trace	0.60	1.70	
Chlorine.....	41.6	55.4	74.0	89.6	62.0
Oxygen required.....	4.24	7.65	8.60	10.41	
Alkalinity.....	188	186	217	169	176
Incrusting constituents.....	65	64	70	71	72
Hardness.....	253	250	287	240	248
Iron.....			1.1		

CHEMICAL ANALYSIS OF WATER FROM CANAL.

OHIO STATE BOARD OF HEALTH LABORATORY, 1902.

PARTS PER MILLION.

	Nov. 10	Nov. 12	Nov. 14	Nov. 19	Nov. 27
Color.....	20	c25	24	25	55
Sediment.....			slight		
Odor.....	3 E & V	2 E & V	3 V & S	3 V	3 V & P
Total solids.....	489	553	531	595	492
Loss on ignition.....	200	196	170	199	154
Nitrogen as free ammonia.....	0.26	0.036	0.74	0.020	0.038
Nitrogen as albuminoid ammonia..	0.326	0.256	0.326	0.344	0.308
Nitrogen as nitrites.....	0.001	0.001	trace	none	0.002
Nitrogen as nitrates.....	trace	trace	0.20	1.10	1.20
Chlorine.....	57.4	74.8	66.0	90.4	76.0
Oxygen required.....	7.89	8.27	8.94	7.54	9.76
Alkalinity.....	193	195	202	219	170
Incrusting constituents.....	76	55	74	82	63
Hardness.....	269	250	276	301	233
Iron.....				0.9	

CHEMICAL ANALYSIS OF WATERWORKS FROM SWAN CREEK.

OHIO STATE BOARD OF HEALTH LABORATORY, 1902.

PARTS PER MILLION

	Nov. 12	Nov. 14	Nov. 19	Nov. 27	Dec.
Color.....	25	24	20	26	4
Sediment.....		slight		very slight	
Odor.....	1 E	2.V	2.V	2.V	
Total solids.....	334	307	349	332	388
Loss on ignition.....	132	115	135	120	
Nitrogen as free ammonia.....	0.028	0.022	0.028	0.022	
Nitrogen as albuminoid ammonia..	0.220	0.202	0.194	0.178	
Nitrogen as nitrites.....	trace	trace	0.003	trace	
Nitrogen as nitrates.....	none	trace	trace	2.00	
Chlorine.....	7.4	10.4	8.8	11.8	9.4
Oxygen required.....	5.73	7.00	6.45	4.98	6.00
Alkalinity.....	177	186	195	190	172
Incrusting constituents.....	21	30	34	56	40
Hardness.....	198	216	229	226	212
Iron.....			0.8		

CHEMICAL ANALYSIS OF WATER FROM MISCELLANEOUS SOURCES.

OHIO STATE BOARD OF HEALTH LABORATORY, 1902.

PARTS PER MILLION.

	Griffin's well on N.E. 1/4 Sec. 29, Sp'ng field Township.	Maumee River at Maumee bridge.
	Nov. 12	Nov. 12
Color.....	12	30
Turbidity.....	none	
Sediment.....	trace	slight
Odor.....	none	2 V & E
Total solids.....	101	524
Loss on ignition.....	32	185
Nitrogen as free ammonia.....	0.014	0.054
Nitrogen as albuminoid ammonia.....	0.070	0.408
Nitrogen as nitrites.....	none	0.001
Nitrogen as nitrates.....	2.60	trace
Chlorine.....	1.8	55.5
Oxygen required.....	1.31	8.64
Alkalinity.....	29	188
Incrusting constituents.....	8.0	62
Hardness.....	37	250
Iron.....		

CHEMICAL ANALYSES OF WATER FROM WELL ON CLARK'S ISLAND.

OHIO STATE BOARD OF HEALTH LABORATORY, 1902.

PARTS PER MILLION.

	Well on Clark's Island.	Well on Clark's Island.	Well on Clark's Island.	Well on Clark's Island.	Well on Clark's Island.
	Nov. 19 30	Nov. 22 25	Dec. 2 18	Dec. 3	Dec. 4
Color.....	30	25	18	.....	.....
Turbidity.....	.....	.....	.70	.70	.70
Sediment.....	dec.	dec.	dec.	.....	.....
Odor.....	1 E	none	none	.....	.....
Total solids.....	721	723	760	844	715
Loss on ignition.....	212	159	.....	.....	.....
Nitrogen as free ammonia.....	1.250	1.260	1.300	.....	.....
Nitrogen as albuminoid ammonia..	0.332	0.550	.238	.....	.....
Nitrogen as nitrites.....	none	none	.002	.....	.....
Nitrogen as nitrates.....	none	none	trace	.....	.....
Chlorine.....	33.2	32.5	20.2	37.5	36.7
Oxygen required.....	14	14.24	13.34	.....	.....
Alkalinity.....	467	467	570	461	451
Incrusting constituents.....	29	.....	.....	40	39
Hardness.....	484	496	.....	501	490
Iron.....	.....	17.0	15	.....	.....

CHEMICAL ANALYSIS OF WATER FROM WELL ON CORBUTT ISLAND.

OHIO STATE BOARD OF HEALTH LABORATORY, 1902.

PARTS PER MILLION.

	Well on Corbutt Island October 17.
Color.....	18
Turbidity.....	575
Sediment.....	dec. (much iron)
Odor.....	faint earthy.
Total solids.....	673
Loss on ignition.....	208
Nitrogen as free ammonia.....	1.030
Nitrogen as albuminoid ammonia.....	.292
Nitrogen as nitrites.....	none
Nitrogen as nitrates.....	none
Chlorine.....	49.5
Oxygen required.....	10.65
Alkalinity.....	449.
Incrusting constituents.....	33
Hardness.....	482
Iron.....	25.0

TURBIDITIES OF WATER AT PUMPING STATION.

UNITED STATES GEOLOGICAL SURVEY STANDARD, 1902.

Day	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	.....	.....	98	48	.....	.....	77	68
2	.....	98	386	43	.....	149	77	56
3	35	108	310	43	.....	.....	72	81
4	31	98	239	39	.....	149	.....	65
5	56	98	239	39	89	.....	.....	240
6	48	81	.....	43	89	.....	.....	210
7	56	77	176	.....	89	.....	.....	175
8	39	.....	.....	52	81	.....	.....	150
9	48	81	98	60	77	.....	.....	122
10	64	98	89	60	81	.....	.....	108
11	48	.....	89	60	81	.....	48	108
12	39	64	77	56	77	.....	64	98
13	52	98	72	52	72	150	72	90
14	52	123	68	52	89	110	64	77
15	56	.....	77	52	77	110	60	77
16	60	149	.....	52	64	90	56	72
17	52	123	81	.....	60	90	60	72
18	52	.....	.....	.....	60	122	52	122
19	.....	123	108	.....	.....	110	52	210
20	.....	123	.....	.....	56	110	60	.....
21	.....	98	98	.....	60	100	81	.....
22	52	.....	89	.....	60	110	89	.....
23	72	108	89	.....	60	90	89	.....
24	77	108	77	.....	89	110	98	.....
25	72	98	72	.....	81	90	89	.....
26	98	97	72	.....	.....	110	81	.....
27	108	98	68	.....	176	100	72	.....
28	98	98	72	.....	386	90	68	.....
29	98	108	72	.....	205	81	64	.....
30	98	149	60	.....	205	108	60	.....
31	89	....	60	.....	.....	89	.....	.....
Average	63	104	117	50	115	108	70	.....

TURBIDITIES OF WATER IN CANAL AND MAUMEE RIVER AT MAUMEE, 1902.

Canal Water.					Maumee River at Maumee.	
Day	Sept.	Oct.	Nov.	Dec.	Nov.	Dec.
1	.....	.....	123	81	60	56
2	.....	.....	123	64	52	56
3	.....	.....	108	176	43	64
4	.....	205	.....	.....	.....	122
5	.....	.....	.....	.....	.....	210
6	.....	.....	.....	.....	.....	175
7	108	.....	.....	.....	.....	.....
8	123	.....	.....	.....	.....	.....
9	98	.....	.....	.....	.....	90
10	108	.....	.....	.....	.....	78
11	81	.....	89	.....	31	.....
12	89	.....	77	.....	52	.....
13	89	175	68	.....	39	.....
14	89	150	77	.....	52	.....
15	89	150	72	.....	43	.....
16	89	110	77	.....	39	.....
17	81	122	64	.....	48	.....
18	81	150	60	.....	35	.....
19	.....	150	60	.....	77	.....
20	81	175	72	.....	176	.....
21	108	150	89	.....	149	.....
22	98	150	98	.....	123	.....
23	89	122	77	.....	98	.....
24	98	175	89	.....	77	.....
25	108	150	77	.....	98	.....
26	.....	150	89	.....	72	.....
27	149	150	77	.....	64	.....
28	.....	150	68	.....	60	.....
29	239	123	68	.....	52	.....
30	239	176	72	.....	.....	.....
31	.....	149	.....	.....	.....	.....
Average....	110	151	81	.....	70	.....

The Board voted to approve the plans as submitted with the provision that completed plans for the purification of this water supply should be submitted to the State Board of Health for approval, and that the water should be filtered in a manner satisfactory to the Board. The board of water works trustees of Toledo were notified of this action February 2nd, 1903.

At a meeting of the Board held April 8th, 1903, a request was presented from the water works trustees of Toledo, for approval of plans to obtain a public water supply from the Miami and Erie Canal about opposite the Country Club instead of the Maumee River as proposed, should this be found advisable.

The Board voted not to grant such permission, and the water works trustees were notified of this action April 10th, 1903.

REPORT ON PROPOSED WATER SUPPLY FOR VERMILION.

Chapin and Knowles, consulting engineers, having submitted plans and report for a proposed water supply for the village of Vermilion, the engineer visited that place November 23, 1903, and submitted the following report:

"The village of Vermilion, located on the shores of Lake Erie in the northeast corner of Erie County, has a population of about 1,200. It now depends for its supply principally on cistern water, as the well water in the village is generally unsuitable for domestic uses.

"The proposed work is described by the report of the consulting engineers which is as follows:

"The undersigned, on behalf of the village of Vermilion, through its board of trustees of public affairs, begs to present plan 339*a* showing the lake front, soundings thereon, and the Vermilion River in said village, with deepest depth of water, for your consideration in the matter of a public water supply for the village of Vermilion.

"It is proposed to locate the pumping station on the west bank of the river on land to be secured near the head of Ohio Street. To take the raw water supply from the river by means of a 10-inch intake pipe and lead into a pump well, from which it will be pumped by a low service raw water pump into a sedimentation basin containing 50,000 gallons of water, into which a coagulant will be introduced, and after not less than two hours sedimentation, the clarified water will be drawn off from the surface onto a mechanical filter of 500,000 daily capacity, and after such filtration into a clear water basin of not less than 60,000 gallons capacity, and pumped from this clear water basin into the distribution and to an elevated storage reservoir.

"The general arrangement of supply, filter, sedimentation basin and clear water basin are shown on plan 338*b*, subject to the necessary change due to the topography of the land to be purchased.

"The degree of purification proposed, subject to your approval, will be specified in an efficiency of the combined plant of a resulting water, which shall be clear, odorless, free from turbidity, and from all matters in suspension as seen by the naked eye, and the removal of bacteria shall be not less than 98 per cent. in water containing 3,000 or more per cubic centimeter, and when the applied water shall contain less than 3,000 bacteria per cubic centimeter, the efficiency shall be such that not more than 100 bacteria shall be found in the filtered water.

"The coagulant shall be lime and alum, or sulphate of iron and lime each applied in such amounts per gallon as your Board shall advise. And the results of the operation of such plant shall meet with your approval.

"We believe that this source is the best attainable for and within the means of the village. And that the proposed location will be least susceptible to sewage contamination, being located in an opposite direction from the surface drainage, and on a river in which but little serious contamination exists.

"We have examined the beach gravel along the lake front, and have made soundings of the lake bottom between the west and east lines of the village limits, with the result that in our judgment, the beach gravel will not afford a sufficient supply, and be subject to danger of local sewage; and that the character of the lake bottom, and the shoal water existing all along the front, will entail much expense beyond the means of the village, and also require filtration to remove contamination and turbidity, should a supply be taken from the lake. Lake Erie at this point has a hard shale bottom, and is quite shallow, it being necessary to go out nearly a mile from the shore before 25 feet of water may be had, necessary to meet with the requirements of a submerged crib at the outer end of the intake pipe, as prescribed by the United States government.

"Therefore we are of the opinion, that the river presents with the aid of filtration, the most desirable and least expensive source of supply.

"The pipe distribution proposed will extend from South Street, on the south, to Huron Street, on the north, and from Water Street to Decatur Street, the higher parts of the village lying at the proposed site of the pumping station. The level of the country south of the N. Y. C. & St. L. R. R., is such that will necessitate the drainage, should this territory ever build up, going to the northwest into the small creek, rather than into the river above the proposed location of supply."

"In consideration of the fact that mechanical filtration plants of the size proposed are necessarily operated without the aid of a chemist and are therefore liable to failure through the improper use of the coagulant, it would be much safer to obtain a ground water supply from suitably located wells. But it is found upon inquiry at Vermilion that there are no wells in the vicinity either shallow or deep which yield water of a good quality, as the village is underlaid by slate at only a small depth below the surface. Wells of all depths are said to contain much sulphur and iron while the deepest ones contain salt in addition. As stated in the engineer's report, the supply from the beach gravel cannot be depended upon.

"The lake or river must, therefore, be used for a supply and the engineers have chosen the one involving the less expense. The Vermilion River has a watershed of about 400 square miles and contains above Vermilion but one corporation, New London having over 1,000 population and this is 25 miles above. The nearest settlement to Vermilion

is Birmingham, eight miles above, having a population of 400. The river, therefore, receives but little pollution from above the proposed intake.

"The village of Vermilion is drained by two small watercourses, one discharging into the lake just west of the town and one into the river at the foot of Toledo Street. Both are said to receive much sewage. The river water will, however, probably contain a larger number of bacteria than the lake water, but fewer of a pathogenic character, except at times when a northly wind or a rise in the lake causes the sewage from part of Vermilion (see run discharging at foot of Toledo Street on plans) to flow upstream to the proposed intake. The proposed location of the filter and intake directly below a high bluff would prevent much surface drainage reaching them, except in the way mentioned above.

"The river water is said to be generally much more turbid than the lake water, but less liable to sudden changes in turbidity caused by changes in direction and velocity of the wind. This would be an advantage if the coagulant is to be supplied by a more or less inexperienced person.

"The Board should at present require the use of alum as the successful use of sulphate of iron is not yet sure, even when under the direction of an expert.

"The proposed plan should be approved, subject to the future requirements of the State Board of Health in regard to operation of plant."

The question of approving this source of water supply for the village of Vermilion was submitted to the Board and on December 22nd, 1903, the consulting engineers were notified that the proposed supply had been approved subject to the following provisions:

1. Subject to such future requirements as regard the operation of the plant as may be found necessary by the State Board of Health.
2. That the Board does not formally approve of sulphate of iron as a coagulant, though permission is given to temporarily make use of it for such purpose. At a meeting of the State Board of Health, held January 20th, 1904, this action was confirmed by *viva voce* vote.

REPORT ON PROPOSED WATER SUPPLY FOR WEST MANCHESTER.

Application having been made by the village of West Manchester for approval of its proposed water supply, the engineer visited that place September 16, 1903, and submitted the following report:

"West Manchester is a small village of about 500 inhabitants in the northern part of Preble County.

"The village proposes to buy for waterworks purposes a lot 130 feet square, containing less than one-half acre and located near the southern boundary of the corporation. It is 500 feet south of the railroad station and just west of the C. N. R. R. tracks.

"There are about thirty houses within 1,000 feet of this lot; the nearest of these is 300 feet distant. The surface of the village is practically level; though the northwestern part is said to be slightly higher. The topography, however, is not marked enough to enable one to form a definite opinion of the direction of the ground water flow.

"Upon the proposed area a well consisting of a six-inch iron pipe has been driven; and if satisfactory is to be used as the source of supply. This well is forty-three feet deep; passing through six feet of red clay, fourteen feet of blue clay, ten feet of gravel, three feet of brown clay, and twenty feet of gravel.

"To avoid building a standpipe the water is to be forced into the distributing system by means of compressed air; the necessary tank and machinery to be located in a building near the well.

"The well is located nearer the village than it would have been if sanitary conditions had been looked to. But considering the character of the material in which the well is sunk, the present uncontaminated character of the water, and the small amount which will be necessary to supply a village of this size and character, it is quite probable that for several years the water of the well will remain safe. On the other hand there is the possibility, that with the increased use of the water and the consequent increased soaking of filth into the ground and also with the increased area from which the water will be drawn, that it will become polluted. This condition is not likely to obtain in West Manchester for a considerable time however.

"No definite information regarding the yield of the well is available although it is stated the well was pumped for twenty to twenty-five hours before collecting sample. The village should be informed that the proposed method of pumping would be less favorable for the removal of a portion of the iron contents of the water than pumping to an open reservoir would be.

"In considering a case like this the analysis of the water should be given most weight; and the approval of the plan should be subject to the Board's future disapproval in case the water is shown upon analysis to be contaminated."

Samples of the water were collected and sent to the laboratory and the result of the examination is as follows:

REPORT OF EXAMINATION OF WATER FROM WEST MANCHESTER.

PARTS PER MILLION.

Source of sample	Driven well
Number of sample	3229
Color	trace
Turbidity	35.
Sediment	slight
Odor	none
Oxygen required	1.36
Nitrogen as albuminoid ammonia .....	.070
Nitrogen as free ammonia .....	.794
Nitrogen as nitrites	trace
Nitrogen as nitrates	none
Chlorine	4.9
Alkalinity	446.
Incrusting constituents	none
Total solids	509.
Loss on ignition	64.
Iron	1.4
Bacteria per cc.	4000.
Colon bacilli present in 50 cc.	no.

"Although this water is obtained from gravel and not at such a very great depth, yet the analysis shows it has taken on the characters of a so-called 'deep' water. The findings show this water is comparatively free from organic matter as indicated by the various chemical findings. The number of bacteria is quite high but this is not an unusual result in a new well, which this is said to be. Intestinal bacteria were absent sustaining the chemical indications or freedom from pollution by organic matter. The free ammonia of the sample comes from reduction. Therefore this is a suitable water for a public supply considered from the standpoint of organic pollution.

"There are two objections to be noted in this water when its inorganic nature is considered, viz., iron and hardness. The amount of iron present, if not removed, will cause more or less complaint on account of the appearance of the water, the sediment it forms, and the stains it may leave on wash bowls and other fixtures. This water is hard as shown by the alkalinity findings (although the figure given is slightly in excess of the real hardness owing to the presence of alkaline earths) and the water will prove a soap consumer. On the other hand the absence of incrusting constituents shows that the water is free from one very objectionable feature for boiler purposes, viz., the formation of a close hard scale. It is understood that the hardness and iron are not such as to prevent the use of this water for a public supply, but the presence of them makes undesirable features that the analysis easily points out. The analysis indicates a usable water for a public supply."

The question of approving this water supply for the village of West Manchester was submitted to the State Board of Health. On November

23rd, 1903, the board of trustees of public affairs were notified that the State Board of Health had considered the application for the approval of a water supply, to be obtained from a well located near the southern boundary of the corporation on a lot one hundred and thirty feet square five hundred feet south of the railroad station and just west of the C. N. R. R. tracks, and had approved such supply. At a meeting of the State Board of Health, held January 20th, 1904, this action of the Board was confirmed by *viva voce* vote



SEWER SYSTEMS AND SEWAGE DISPOSAL.

REPORT ON A PROPOSED SEWER SYSTEM FOR BOND HILL.

Being informed that the village of Bond Hill was about to construct a system of sewers, Dr. Byron Stanton, a member of the Board, was appointed a committee to investigate and report. His report is as follows:

"Bond Hill is situated in Hamilton County, north of the city of Cincinnati, with which it will be incorporated within the next two or three months. It has a population of about 1,200. It gets its public water supply from St. Bernard and nearly half of the houses have water connections and with the completion of a system of sewers that will permit of water closet connections the number of water connections will be much increased.

"The proposed system includes nearly all of the built-up streets of the corporation. It is to be a combined sewer. That part of the sewer in Forest Avenue, about 1,600 feet, and about 500 feet in Paddock Road will be of brick, 33 inches in diameter, the rest being of vitrified pipe, from 12 to 21 inches in diameter.

"At a point where Forest Avenue approximates Bloody Run the storm water will be discharged into that stream, but a sanitary sewer 12 inches in diameter will be carried through a street as yet unnamed to Linden Avenue, thence through a 'right of way' to Ross Run, where a temporary outlet will be made into the run, but on completion by the city of Cincinnati of a sanitary sewer now under contract and to be completed within one year, the sewer will be carried under the creek to a permanent outlet in the city sewer. This city sewer will discharge into Mill Creek until such time as an intercepting sewer shall be made down Mill Creek valley to the Ohio River or the sewage purified by the city of Cincinnati.

"As Bond Hill is soon to be a part of the city there will be no difficulty about getting the right to tap the Ross Run sewer. It is therefore recommended that the plans, submitted by Earnshaw and Punshon for the Bond Hill sewers, be approved."

The question of approving plans for a system of sewers for the village of Bond Hill, as prepared by Messrs. Earnshaw & Punshon, was submitted to the Board and on September 15th, 1903, the mayor and council were notified that said plans had been approved.

At a meeting of the Board, held October 15th, 1903, this action was confirmed by *viva voce* vote.

REPORT ON PROPOSED SEWERAGE FOR CINCINNATI.

On January 21st a request was received from H. J. Stanley, chief engineer of the board of public service, of Cincinnati, asking the Board to approve sewerage for part of District No. 12 of that city. The proposed plans were submitted to Dr. Byron Stanton, member of the Board, at Cincinnati, who made the following report:

"The application of the board of public service of Cincinnati for the approval of plans for sewers in that part of Division No. 12 included in Corbin, Brown, Watson, Humbert and other streets, avenues and rights of way having been referred to me for investigation and report, I would respectfully present the following:

"This division is in the east end of the city lying between the Little Miami Railroad and the Ohio River, about three miles above the intake of the waterworks. The plans contemplate a combined system of sewers to discharge into Crawfish trunk sewer, plans for which were approved by our Board in 1897 upon condition that no connections for house drainage, water closets or vaults should be permitted without the consent of the State Board of Health. The division is contiguous to Division No. 14, plans for which were approved by the Board about one year ago upon the same condition as named in the approval of the Crawfish Creek sewer.

"The object in constructing the sewers at an early day is partly to minimize expense by putting in the sewers before improving the streets and partly for the abatement of nuisances caused by defective surface drainage.

"Approval of the plans is recommended upon the conditions named in the approval of Crawfish Creek sewer and Division No. 14, viz: that no connections for house drainage, water closets, or vaults shall be permitted without the consent of the State Board of Health."

At a meeting of the Board January 28th, 1903, these plans were approved upon the condition that no connection for house drainage, water closets or vaults shall be permitted without the consent of the State Board of Health, and that said approval shall take effect upon the receipt by said State Board of Health of a written agreement of the board of public service that no permit shall be granted for house connections contrary to said condition.

REPORT ON PROPOSED SEWERAGE FOR CUYAHOGA FALLS

Plans and specifications for a system of sewerage for the village of Cuyahoga Falls having been submitted by Snow and Barbour, consulting engineers, the engineer, Mr. Pratt, visited Cuyahoga Falls on August 22nd, 1903, to make an investigation and reported as follows:

"The application is made and the plans submitted to the Board by Messrs. Snow & Barbour, engineers for the village.

"Cuyahoga Falls is located upon the upper part of the Cuyahoga River, five miles north of Akron. The river in passing through the village drops 154 feet and the power thus developed is used to a large extent by factories which do not, it is said, discharge objectionable manufacturing wastes into the stream.

"The population of the village is said by the superintendent of public works and others to be 5,000, although according to the engineer's estimate it will not reach that figure until the year 1910. It is further stated by the village officials that the system will be built very slowly and that it will be many years before all the population are connected.

"The village is divided into six sewer districts, the first five of which are located near the river and include the thickly settled part of the town. They will discharge at two outlets, one on either side of the river below the lowest dam. It will be possible at any time if purification or change of outlet is desired, at comparatively small expense to rebuild the lower part of the system on the west side of the river and collect all the sewage of these five principal districts at one outlet on the east side.

"District No. 6 is outlying and sparsely settled and if sewerage is ever needed, the district can be made to drain into the Cuyahoga River at a point one mile below the present built up part of the village.

"The plans submitted provide for an entirely separate system of sewerage, the storm sewers to discharge into the river or upon its banks at ten or twelve different points. These sewers appear to be large enough to drain the respective contributing areas satisfactorily.

"The sanitary system is designed to serve a population of 27,560 on a basis of 60 gallons per capita flow; sewers flowing half full. Automatic flush tanks are to be used at all principal dead ends which in connection with the fairly good grades to be used will keep the sewers in good condition.

"The two principal outlets as mentioned above are below the lowest dam and also below the thickly settled part of the village, the easterly outlet being 600 feet down stream from the westerly one. The river at this point is in a gorge, 150 feet below the street and there are no houses within 300 feet of the edge of the gorge. The plans do not show whether it is intended to discharge the sewage at the top of the gorge or convey it down into the stream through iron pipes. This last method is necessary in order to prevent the sewage being blown and spattered over the sides of the gorge and thus creating a nuisance; also as a means of increasing the distance necessary for any odors to pass through in order to reach the nearest house and to allow the odors under certain condition of wind to be kept down below the level of the village.

"The engineers have prepared, from the records of yield of the Muskingum watershed, an estimate of the flow of the Cuyahoga River

and judging from actual gaugings of the stream, made during the present year, this table gives results about right. There is probably an average dry weather flow of 75 to 100 second feet. According to latest investigations an unpolluted stream having a flow of 75 second feet will surely take care of the sewage of 10,000 persons if properly mixed with the stream and may take care of the discharge from 30,000 without causing pollution which can be detected by the sight or smell. It is true that the flow of the river will be largely held back by dams, but it is also true that the night flow of sewage will be correspondingly less in volume and weaker in character than the day flow.

"Below Cuyahoga Falls the river passes through farming country containing but few settlements until the city of Cleveland 40 miles below is reached. The city of Akron discharges all of her sewage into the Little Cuyahoga River which, with the exception of that portion used to feed the Cleveland & Erie Canal, enters the main river about three miles below Cuyahoga Falls.

"It is recommended by your engineer that the system of sanitary and storm sewers, as shown upon the plans submitted, be approved, provided:

"1. That the sanitary sewer outlets be so constructed that the sewage will be discharged directly into the swift current of the river.

"2. That purification works be built when deemed necessary by the State Board of Health."

The question of approving the system of sewerage for the village of Cuyahoga Falls having been submitted to the Board for approval, Snow and Barbour, consulting engineers, were notified on August 31st, 1903, that the Board had voted to approve said system of sewerage upon the following conditions:

1. That the sewer outlet be an iron pipe carried over the gorge discharging into the river.

2. That the village agree to purify the sewage in a manner satisfactory to the State Board of Health when, in the opinion of said Board, such purification shall be deemed necessary.

At a meeting of the State Board of Health held October 15th, 1903, this action was confirmed by a *viva voce* vote.

REPORT ON PROPOSED SEWERAGE AND SEWAGE DISPOSAL FOR DELPHOS.

April 8th, 1903, Riggs and Sherman, consulting engineers, for the village of Delphos, appeared before the Board and submitted plans for a sewer system and a sewage disposal plant for that village. The following is a copy of their report:

"This village has a population according to census of 1900 of 4,517. In 1890 the census showed something over 4,500; an increase of only four or five in ten years.

"Delphos is located at the crossing of the Pittsburg, Ft. Wayne & Chicago and Clover Leaf railroads; the east half of the town being in Allen County and the west half in Van Wert County, and the north corporation line runs up to the Putnam County line, the county line between Allen and Van Wert counties being the central line of the Miami and Erie Canal. The Miami and Erie Canal runs due north and south, almost exactly on the center line of the town. On the west, Jennings Creek, a fair sized stream, runs from south to north just west of the built-up section of the village. In the western part of the village, Flat Fork Creek, a small stream, flows from south to north emptying into Jennings Creek some distance north of the village.

"The surface water is at present fairly well provided for by a system of tile underdrains with catch basins, discharging into these two streams. The present sewers run east and west, with a large number of outlets into the streams.

"The country around Delphos is extremely flat. The fall on the surface of the ground from the south corporation line to the north corporation line is 10.5 feet in a distance of 9,616 feet. From the north corporation line to Jennings Creek, at the proposed site of the disposal plant, there is a fall of 12.2 feet, giving us a total of 22.7 feet in a distance of two miles. Inasmuch as the ground falls from Main Street slightly to both east and west, it would be impossible to secure a gravity system of sewerage with self-cleansing grades. For this reason we have decided that the proper system to install is a strictly separate system, keeping all storm water out of the sanitary sewers, and establishing four pumping plants or pneumatic lifts as follows:

"Station A, located at the corner of Cleveland and Bredeick streets. This station provides for the sewers south of the Pittsburg, Ft. Wayne & Chicago Railroad and west of the canal. The present population in this district is very small, and in our judgment it is doubtful whether this station will ever reach its full capacity. Very few of the sewers shown on the plan for this district are a present necessity, and it is not probable in our judgment that there will be any early developments in the district. Station A is calculated to provide for a daily flow of 306,700 gallons and population of 3,810.

"Station B, located at the corner of Fifth and Bredeick streets, provides for the section of town north of the Pittsburg, Ft. Wayne & Chicago Railroad and west of the canal. This section is well built up very largely with a better class of residences, and it is probable that nearly all of the sewers in the district will be required immediately. This ejector station

is designed to care for a population of 3,000, with a daily flow of 241,500 gallons.

"Station C, located at the corner of Main and Cleveland streets, provides for the district south of the Pittsburg, Ft. Wayne & Chicago Railroad and east of the canal. This is a small district partially built at present, but it is probable that in immediate construction many of the sewers may be omitted for the present. This station is designed to care for a population of 2,630, with a capacity of 211,700 gallons.

"Station D, located at the corner of Tenth and Main streets, provides for the district east of the canal and north of the Pittsburg, Ft. Wayne & Chicago Railroad. This includes nearly all of the business section and quite a good resident section. It is designed to provide for a population of 3,800, and capacity of 306,000 gallons.

"These sewers are designed to provide for a total daily discharge of 700,000 gallons or 97 cubic feet per minute; this is based on 10,000 population with consumption of 70 gallons of water per day per capita, all of which reaches the sewers. To this we have added 15 per cent. for infiltration, making a total capacity of 112 cubic feet per minute. This requires a 12-inch sewer on .25 grade. We figure on using cast iron force mains from ejector stations A, B and C, discharging into a 15-inch gravity main sewer at a point near pumping station D, thence to outlet, securing a gravity flow to creek.

"We have for the elevation of our sewer outlet 62.72 which is 5.7 feet above the high water of March, 1903. This point is in Putnam County on the banks of Jennings Creek, just north of the city limits. At this point we propose to establish disposal works, using a septic tank.

"Based on the present population, we have to provide for 402,500 gallons total daily flow. Allowing an eight hour period for passage of sewage through the tank, we provide for 8,933 cubic feet capacity of tank. The elevation of sewage in the tank 62.6. The bottom of tank 56.6. This enables us to clean our tanks by flushing instead of pumping sludge.

"We propose to supplement the tanks with single contact coke filters.

"We submit herewith general data and map and respectfully ask your approval of the following:

"1st. Of the pumping stations as proposed.

"2nd. Of the separate system as designed.

"3rd. Of the disposal, consisting of septic tanks and single contact filters.

"4th. Of the automatic regulating device of Mr. W. S. Shields with whom we are co-operating in the preparation of plans, for the regulation of flow from the septic tanks to the filter beds."

The Board at a meeting, held April 8th, 1903, voted to approve the plans for a system of sewers and sewage disposal for Delphos, as sub-

mitted by Riggs and Sherman, consulting engineers, and the engineers were so notified on April 10th, 1903.

REPORT ON SEWAGE DISPOSAL AT FAIRMOUNT CHILDREN'S HOME, ALLIANCE.

Complaint having been made about the sewage disposal plant at the Fairmount Children's Home, Mr. Hartzell and the engineer, Mr. Pratt, visited that institution on May 5th, 1903, and after an investigation submitted the following report:

"The first sewage disposal system for this institution was a system of sub-surface disposal, constructed by Mr. L. E. Chapin, C. E., of Canton, after being approved by the Board in 1896. This system was satisfactory for a time, but after a period of about two years it is said that the distributing pipes became filled with solid matter and ceased to be of use.

"The present system of disposal was approved in 1899, and was built in 1900 by the Bacterial Purifying and Cleansing Company, of Alliance, the intention being to effect purification by septic action followed by aeration, oxidation in contact beds and double filtration through beds of sand and gravel and coke breeze. The entire system is located within three hundred feet of the boiler house, and consists of a circular tank twenty feet in diameter, made of brick laid in cement mortar. The tank has a concave bottom and is covered by a spherical dome. Access to it may be had by means of an iron cover two and one-half feet in diameter, said to fit air-tight. The sewage from the home, of which there is about 16,000 gallons per day, is discharged into this tank which holds approximately one day's flow, and overflows from a siphon so arranged that the sewage is kept at a depth of about ten feet at the center and seven feet at the sides of the tank. The sewage enters the siphon through two openings, one at the bottom and one four feet above the bottom. The exhaust steam from the boilers is discharged into the tank with the idea of causing a rotary motion and forcing as much solid matter out of the tank as possible. From this tank the sewage passes through an aerating chamber containing several stone steps over which it flows in a thin sheet, the chamber being ventilated by means of a pipe connected with the stack at the boiler house.

"Immediately below the aerating chamber are two contact beds or oxidizing tanks. These tanks are of brick masonry and each of them is ten feet wide and twenty feet long and contains four or five feet of large cinders, pieces of broken stone, and pieces of broken tile. A division wall is built across the center of each, so that the sewage on being received passes from the aerating chamber, passes downward through the

material in the first compartment and upward through that in the second compartment, from which it overflows and runs on to the filter beds, four in number, twenty feet square, consisting principally of coarse gravel. The flow of sewage is daily changed from one contact bed to the other, each being drawn off through an outlet at the bottom when not in use. The flow on to the filter beds is changed from time to time. The distribution of sewage on these filters is very uneven and the surface of the beds was in poor condition at the time of inspection. Judging from the odor of the final effluent as it passes into the run, the degree of purification effected by the entire process is small.

"The reason for complaint on the part of the officials at the home was on account of the offensive odor which the system creates. This odor is caused principally by the sewage and sewage-covered material on the contact beds and to some extent by that on the filter beds.

"It is not unreasonable to expect odors from the most efficient sewage disposal systems where the sewage, whether septic or fresh, is exposed to the air, and therefore it is important to have the system at a safe distance from any dwelling. This is not the case at the Fairmount children's home.

"On account of the present scheme of blowing steam into the septic tank in order to break up the surface scum and force out the solid matter, it is impossible to tell what reduction of solid matter has been accomplished by septic action. It is possible that this process may kill the bacteria necessary for septic action. A sample of sewage was collected at the inlet of the tank in a manner designed to represent the average character of the fresh sewage and a sample of the effluent from the contact beds was also collected. The analyses of the samples show that there is no purification of the sewage in its passage through the septic tank, aerating chamber and contact beds and very little reduction of solid matter.

"As the run which receives the effluent is a tributary of a stream which is used by the city of Alliance as a water supply, it is important to secure a system of sewage disposal which will not only prevent any odors reaching the occupants of the home, but will also produce as good an effluent as possible. Your committee therefore recommends that filter beds, composed of sand and gravel, of sufficient area to thoroughly purify the sewage of two hundred people be constructed on the low land at the easterly side of the road in the rear of the Home; that the use of the septic tank be discontinued and the sewage made to flow directly into a covered flush tank which may be made by modifying the construction of the present contact beds, from which tank the sewage be discharged intermittently upon the sand filters, and that a competent sanitary engineer be engaged to prepare plans and submit them to the State Board of Health for approval."

This report was submitted to the State Board of Health and was approved. Copies were sent to the superintendent of the home and to the county commissioners of Columbiana and Stark counties.

In July, 1903, plans and specifications were received from Snow and Barbour, consulting engineers, for a system of sewage purification for the Fairmount Children's Home, which were submitted to the engineer for review. The engineer's report was sent to the Board with the following comment and recommendation:

"You may recall that the Board has already approved two different plans for sewage disposal at this institution, which have proved to be failures. In my judgment the success of the plans proposed here will depend very largely upon the character of the sand. If this should be of too fine a grain it is doubtful whether filters could be successfully operated. The constructing engineers have promised to furnish samples of the sand to be used in the filters.

"I have, therefore, to recommend that the plans be approved provided an analysis of the sand shows it to be of a suitable quality."

Following is the engineer's report:

"Acting upon the recommendation of the State Board of Health the directors of the Fairmount Children's Home have had plans made which provide for the purification of the sewage of this institution by sand filtration at a proper distance from the building. The engineers engaged for the work are Messrs. Snow and Barbour. The plans provide for the collection of the sewage in a flush tank holding 2,400 gallons, from which it is to be discharged intermittently upon four filter beds, each about 50 feet square prepared by excavating the natural soil and filling with three and one-half feet of sand over an eight inch layer of coarse material. Each bed has a four inch underdrain through its center. A screen of three-fourths inch open space is placed in a manhole near the building to intercept the coarse substances in the sewage. Discharge from the flush tank is to be made by the means of some patented double siphon, which will discharge alternately upon any pair of the four beds desired. This apparatus will be guaranteed by the makers to work satisfactorily.

"One pair of beds is to be used every other day, change being made daily by the man in charge. The sand for the filtering material is to be dredged from the Mahoning River four and one-half miles distant from the home. Samples are to be collected and sent to the State Board of Health for analysis.

"The engineer's estimate of the flow of sewage is 15,000 gallons per day with no prospect of material increase. With this amount the rate of filtration will be 64,000 gallons per acre per day which considering the diluted character of the sewage will not be too high.

"In order that the beds perform their work satisfactorily it is necessary that they receive considerable attention, and it is recommended that

the care-taker be given thorough instructions as to the proper manner of scraping the beds without removing the filtering material, and as to the importance of keeping the surface of the beds clean and graded so that sewage will be distributed over them evenly; also that the directors be informed that such care is essential to the success of the works."

The Board voted to approve the plans and specifications submitted by Snow and Barbour provided analysis of the sand proved it to be of satisfactory quality for the filters. The analysis proving satisfactory an approval was sent to the engineers August 4th, 1903.

At a meeting of the State Board of Health held October 15th, 1903, this action was confirmed by a *viva voce* vote.

REPORT ON PROPOSED SEWERAGE FOR FAYETTE.

At the meeting of the State Board of Health held April 8th, 1903, the following resolution of council and plans for a system of storm water sewers for District No. 1, of the village of Fayette, with an outlet into Turkey Foot Creek were presented:

"WHEREAS: The council of the village of Fayette, Ohio, has declared it necessary to construct a system of sewers in said village,

"Therefore, Be it resolved, that the State Board of Health be and are hereby requested to permit the construction of a system of sewers in storm water sewer District No. 1, as shown by attached map. The boundaries of said district and the locations of the sizes of the sewers in said district are shown on said map. (Passed by council this 25th day of March, A. D., 1903.")

After consideration the Board voted to approve these plans upon the condition that the sewers be used for storm water purposes only. The mayor of the village, Mr. Jacob L. Mattern was notified of the action of the Board on April 14th, 1903.

REPORT ON PROPOSED SEWERAGE AND SEWAGE DISPOSAL FOR GIRARD.

At a meeting of the Board, held April 8th, 1903, Mr. E. G. Bradbury, representing Messrs. Snow and Barbour, consulting engineers, presented plans for sewerage and sewage disposal for the village of Girard.

The report of the consulting engineers is, in part, as follows:

"Girard is located in Trumbull County, and lies on both sides of the Mahoning River about four miles above Youngstown. By the last federal census this village had a population of 2,630.

"There is no public water supply, but it is expected that one will be provided in a short time.

"The system of sewerage as designed provides for house and manufactural wastes only, and the method of disposal selected consists of septic tanks and intermittent filtration through ashes or cinders.

"There is very little opportunity for selection of site for the disposal plant, there being only one general location where sewage can be collected by gravity. This is on the flats in the southwest part of the village, east of the river, which at this point curves to the east. The site chosen is just within the corporation and, while closer to a colony of foreigners than might be desired, is at a greater distance from the important streets than a location farther south on account of the bend in the Mahoning. Night soil is now dumped on this lot.

"The close proximity of the city of Youngstown necessitates a high degree of purification and unquestionably indicates a plant of the intermittent filtration type.

"In consideration of the manufactural wastes, which cannot be eliminated from the study of the problem, we have decided to outline a plant with a capacity of 250,000 gallons per day.

"The liquid collected by the sewers will probably be normal city sewage, perhaps rather concentrated; the only unusual feature is the possible interception of tannery wastes, which being more or less antiseptic in character should be largely diluted with domestic sewage before an attempt is made to purify them. As soon as the system is sufficiently extensive to accomplish this dilution, no trouble is anticipated from the application of the tannery liquids.

"The character of the soil at the disposal field was thoroughly investigated in the hope that natural filtration beds would be a feasible solution. The results of this were such as to prove the soil entirely unsuitable for the purpose. The prevailing material is a fine river silt, mingled with clay and underlaid by a gravelly material in which also there is a considerable quantity of clay present. The material is somewhat pervious, but its filtering capacity is so low that a large area would be necessary to purify the quantity of sewage anticipated, a fact that, in view of the value set on the land, prohibits consideration of the scheme.

"Large quantities of ashes are produced at the iron works within reasonable hauling distance, and in view of their porosity and proven value as a filtering medium, are recommended for this plant.

"The entire plant as designed consists of a septic tank in three units, with plank covers; aerating devices; dosing tank and chamber, arranged for automatic distribution; intermittent filters of ashes, or possibly partly slag; aeration of lower strata of beds, and drains to the river.

"In the dosing chamber will be installed an automatic device for diverting the flow onto the several beds, accomplishing uniform dosing at

frequent intervals, which has been proved so great an aid to successful filtration.

"Passing out from this chamber the sewage will fall over a series of concrete steps for further aeration and enter the beds through wooden sluices arranged to properly distribute the flow over the entire bed surface.

"The area of the beds is about 1 acre, divided into 4 units, and the depth at the drains is 5 feet.

"Passing down through the fine material, aerated by the system of ventilation in the lower section of the bed, and gases having been given ample opportunity for escape, a high degree of nitrification will be accomplished.

"The purified liquid will be collected by a system of 4-inch, 6-inch and 8-inch piping in the bottom of beds, the floor being graded in slopes to the drains and covered with a 4-inch layer of coarse ashes or cinders for this purpose.

"Thence the discharge is direct to the river passing through the brick outlet chamber where is located the balanced gate to prevent the inflow of river water. A valve and connection from the dosing chamber permit it to be emptied into the river in case of accident.

"Should only a part of the sewer system be constructed at present it would be advisable to build only half the area of filter designed. A saving of several thousand dollars would be effected on the present outlay and little additional expense incurred when extension to the whole design became necessary."

The cost of the proposed work is estimated as follows:

District No. 1, 19,577 feet.....	\$19,203 28
District No. 2, 21,395 feet.....	21,613 21
District No. 3, 12,347 feet.....	11,584 84
District No. 4, 6,322 feet.....	6,079 35
Main intercepting and outfall sewer, 3,724 feet.....	3,954 72
Disposal plant.....	16,588 84
Total excluding land.....	\$79,024 24

The Board voted to approve these plans but only upon the condition that sewage purification works be constructed at once, and the authorities were so notified April 9th, 1903.

REPORT ON PROPOSED SEWERAGE FOR KENTON.

The city of Kenton made application for approval of plans for sewerage for District No. 2 of that city. The engineer made an investigation

and his report was presented to the Board at a meeting held October 14th, 1903. A delegation of citizens of Kenton appeared before the Board at that time and requested that the plans be approved. As the engineer's report showed that the river at Kenton was already badly polluted by sewage from the city, the Board voted to disapprove the plans for discharging additional sewage into the river, and the authorities were so notified.

Subsequently, upon an urgent request, the secretary of the Board made a personal inspection of the district. His report corroborated with that of the engineer as regards the present polluted condition of the river. The question of reconsidering the vote to disapprove the plans for Sewer District No. 2 was submitted to the Board and the former action of the Board was reaffirmed.

REPORT ON PROPOSED SEWERAGE FOR MONTPELIER.

The village of Montpelier having requested the Board's approval of a sewerage system, the engineer, Mr. R. W. Pratt, visited that village August 8th, 1903, to make the necessary investigation. Mr. Pratt reported as follows:

"Montpelier is a village of 2,500 inhabitants situated in the extreme northwestern corner of the state upon the St. Joseph River, a tributary of the Maumee River. It is said to be growing rapidly.

"It is proposed to construct a system of combined sewers to drain the entire corporation, most of which system will be built at once, although it is not expected that more than five or six hundred people will connect at present. The principal sewer of the system is to be of concrete 54 inches in diameter and is to take the flow of Cranby Run, a small stream in the western part of the corporation having a watershed of about two square miles which now flows through the thickly settled part of the village and receives considerable sewage. It also causes trouble by overflowing and flooding cellars. This large sewer is to discharge into the St. Joseph River about 500 or 600 feet below Main Street. There are several small sewers which will have to discharge into the river north of town as they drain areas too low to connect with the 54-inch sewer. An area of about 20 acres directly north of the Wabash R. R. will discharge through a 20-inch sewer near the railroad bridge. Another area of about the same size just south of the railroad will discharge through an 18-inch sewer just south of the railroad bridge. The sizes of these last two sewers are insufficient.

"The St. Joseph River at Montpelier has a watershed of 250 square miles, and at the time of my visit, although at a very dry season, there was at least a flow of 20 cubic feet per second, which should be ample to take care of the sewage from the entire population of the village. There was also a very good velocity. It is said that these were representative con-

ditions for dry-weather. The next town below on the stream is Edgerton, 20 miles from Montpelier.

"It is recommended that the Board approve the plans as submitted, provided that the outlets of the small sewers which discharge into the river north of Main Street be carried by means of iron pipe into the deep water, so as to avoid local nuisances; also that the size of the sewer draining area just north of the Wabash R. R. be increased from 20 inches to 30 inches, and the size of that draining area just south of the Wabash R. R. be increased from 18 inches to 24 inches."

This report was submitted to the State Board of Health for consideration and on September 17th, 1903, the mayor, Mr. C. E. Thomas, was notified that the Board had voted to approve the plans for sewers for the village of Montpelier with an outlet into the St. Joseph River.

At a meeting of the Board, held October 15th, 1903, this action was confirmed by *viva voce* vote.

REPORT ON SEWERAGE AND SEWAGE PURIFICATION FOR MT. GILEAD.

On January 21st, 1903, Mr. J. B. Weddell, as consulting engineer for the village of Mt. Gilead, made application for the Board's approval of plans for a sanitary sewer system and purification works for that village, and the following report:

"Mt. Gilead is a town of about 2,000 inhabitants, situated on rolling ground easily drained and very healthy.

"The treatment of sewage is accomplished by different methods which are controlled by certain limitations, environments or physical conditions.

"When the situation is favorable for using 'intermittent filtration' the low cost and excellent results place it first in the list to be desired, and the village of Mt. Gilead is privileged to have more than one site for works of this kind, and therefore this method is hereby recommended and the purification part of this report deals with the development of the system on this line and plan.

"A suitable site for such a plant is in the southwest part of the town, situated in the southwest corner of the northeast one-fourth and southeast corner of the northwest one-fourth of Section 2, Township 13, R. 21, containing five acres of land.

"Sewage will reach it by gravity and it can be bought for sixteen hundred dollars.

"While the soil thereon is not fit for filters, nearby is an abundance of material for the purpose, and the cost of construction will be low.

"The foregoing site will accommodate all the town except the extreme western portion of District No. 3, which has but few improvements.

"To provide a site that would include all this district meant going nearly a mile further down stream from the site chosen, with an artery of more than a half mile in length to connect it, together with expensive right-of-way and damages for new site, all of which would likely cost \$10,000 or \$12,000 more.

"To provide for said west part of said district it is the purpose to build a small reservoir and filter bed west of the corporation a few rods on the south side of the Marion road and connect it with an 8-inch line. This can be done (when needed) at much less expense than the former. At present there is very little demand for sewerage in this west part.

"The sewer outlet commences at the intersection of Main and South streets at Station 'O' and runs westerly in said South Street to and through the site of the purification works to the creek, a distance of 2,100 feet.

"The first 165 feet is 12-inch pipe and the remaining distance, 1,935 feet, is 15-inch pipe.

"For present purposes the purification works will consist of one brick reservoir and two filter beds of the dimensions shown on the plans, with provisions for extension as may be needed.

"The filters are to be built of approved gravel and sand, not less than 2 feet thick, underdrained with 4-inch and 6-inch sewer pipe."

The plans were considered by the Board at a meeting held January 28th, 1903, and were approved. The consulting engineer was so notified February 2nd, 1903.

REPORT ON THE PROPOSED SEWERAGE FOR MT. VERNON.

Having been notified that the city of Mt. Vernon was proposing to construct a system of sewers for District No. 3, the attention of the board of public service was called to the fact that it would first be necessary to secure the approval of the State Board of Health of their plans. A request was received from the president of the board of public service asking that a representative of the Board be sent to Mt. Vernon to make the necessary investigation. The engineer, Mr. Pratt, visited Mt. Vernon on August 13th, 1903, and submitted the following report:

"Mt. Vernon, a city of about 9,000 population, is located in the center of the state upon the Kokosing River, which is tributary to the Muskingum and has at this point a watershed of about 250 square miles.

"The city is divided into four sewer districts, two of which, Nos. 1 and 2, are already sewered.

"District No. 1, sewerred in 1891 without advice from the State Board of Health, is a small thickly settled area located upon a ridge in the center of the city. It is drained by a 36-inch sewer which takes the sewage from about 1,000 people together with all the surface water of the district. The outlet is under the north end of Main Street viaduct at a point where the river flows in two channels. Although there is current enough to carry away the sewage, the channel receiving it has become partially filled directly opposite the outlet, so that a portion of the sewage, including much solid matter, is retained in a small pool under the bridge. The business section of the city extends nearly to the outlet.

"A private drain 150 feet below this outlet discharges a white liquor resembling starch factory waste which discolors the river, and judging from the bubbles arising from the bottom just below, considerable putrefaction takes place.

"District No. 2 is a large area in the western part of the city. It has a system of sanitary sewers five or six miles in length, and accommodating 2,500 people. The system was approved by the State Board of Health in 1897 on condition that the sewage should be purified when deemed necessary by the Board. The outlet is located next to the C. A. & C. R. R. one-half mile west of the railroad station. There are no houses within about five hundred feet, and no very offensive odors at the outlet. There was a considerable accumulation of filth and dry sludge, however, on the stones between the outlet and the water surface, but the sewage could not be detected in the river more than 75 feet down stream.

"District No. 4 is located in the extreme eastern end of the city, is sparsely settled and probably will not be sewerred for a long time. The river first passes this district upon entering the city limits.

"District No. 3, which it is now proposed to sewer, covers an area of about one-half square mile, and is located between districts 1 and 4 and is fairly well built up and contains about 1,500 people who will connect with the sewers as soon as they are built. It is estimated that as soon as a house is built upon every lot as now laid out, there will be at least 2,000 people connected. There is a large iron works in this district which employs 600 men and is at present in very bad sanitary condition and in immediate need of drainage.

"It is proposed to build a combined system in this district for the reason that in part of it surface as well as sanitary sewers are badly needed. The system will cost about \$28,000.00. The main sewer is to be of brick, 54 inches in diameter, and is to discharge into the Kokosing River under the B. & O. R. R. bridge.

"The river is here divided into two channels by a bridge pier and sand-bar, but the channels unite about 75 feet below the bridge. A rough measurement of the flow in the channel which is to receive the sewage showed it to be about 15 second feet and about one-half the total flow of

river. A few hundred feet below the bridge, a gas pipe is laid across the bed of the stream and backs the water for 100 feet or more up-stream. This would be undesirable if sewage is to be discharged above it.

"The nearest houses to the proposed location are 300 feet north of the edge of the built-up portion of the sewer district.

"After passing Main Street 500 to 600 feet below the location of the proposed outlet, where District No. 1 discharges, the river swings off toward the south and there are very few houses near its banks until Gambier, six miles below, is reached. The Muskingum River, 70 miles below Mt. Vernon, is used by Zanesville for a water supply.

"District No. 3 is without doubt badly in need of both sanitary and surface drainage and the city has decided to use the method of providing for its needs which will require the least present outlay, namely: a combined system. But when we consider that the flow of the river during the driest months of the year, judging from the yield of the Muskingum watershed and from present observations of the river itself, is 20 second feet and that after the proposed sewer is built there will soon be 5,000 people discharging sewage into the river, which is a flow of about four second feet per 1,000 persons discharging sewage, it would seem that the time for purification is not far off. When the time comes, it means that an intercepting sewer for domestic sewage only must be constructed along the river to some suitable disposal place below town. The city, in building a combined system for this district, is not looking ahead sufficiently.

"It is recommended that the Board allow the city to discharge sewage from District No. 3 at the B. & O. R. R. bridge as per proposed plans, provided:

"1st. That as in the case of District No. 2 the sewage be purified when deemed necessary by the Board.

"2nd. That the obstruction to the flow now caused by a gas pipe laid in the bed of the river 300 to 400 feet below proposed outlet be removed before discharging any sewage, and

"3rd. That any deposits in front of the outlet when built be removed from time to time in order to avoid a local nuisance.

"Also that the Board strongly urge the city to revise the proposed plans and provide sanitary sewers which may be easily connected with an intercepting sanitary sewer in the future; and in addition to provide storm water sewers where necessary."

The question of approving proposed sewerage for District No. 3 in Mt. Vernon was submitted to the Board and on September 3rd, notice of its action was sent to the president of the board of public service as follows: "The Board is convinced in the first place that the amount of sewage you are proposing to convey to the river, added to what is already reaching the river from your city, will be too great a burden for the

stream to carry, and will cause its pollution. The Board has therefore voted to disapprove plans unless some satisfactory provision is made for purifying the sewage at this time. The Board strongly urges also that your plans should be revised so as to provide a strictly sanitary sewer for District No. 3, with such storm water sewers as may be actually necessary to carry off surface water."

At a meeting of the State Board of Health held October 15, 1903, this vote was confirmed by a *viva voce* vote.

REPORT ON PROPOSED SEWERAGE AND SEWAGE DISPOSAL FOR NEWCOMERSTOWN.

At a meeting of the State Board of Health, April 8th, 1903, Mr. Edwin R. Davis, consulting engineer, of Boston, Massachusetts, presented plans for a separate system of sewers for the village of Newcomerstown. The Board approved of these plans, but upon the condition that the approval should not take effect until satisfactory plans for sewage purification works had been submitted to and approved by the Board.

Under date of April 21st, 1903, Mr. Davis submitted the following description of a plan for sewage purification for this village:

"The method of purification chosen is that of land irrigation. The tract of land selected is about a half mile west of the corporation line and is so bounded by natural conditions that the erection of houses within a quarter of a mile in any direction is very improbable. The amount of land available is such that the area of the disposal fields can be increased from time to time as may be necessary to a maximum of about thirty (30) acres, which would represent an increase of at least ten times the present population. The character of the soil is very favorable to purification; the surface and to a depth of about three and a half feet being sand of medium size grain, below that gravel. It is planned to underdrain the field with three inch tile, carrying the effluent into Buckhorn Creek and the Tuscarawas River. I have designed a settling basin in which the coarser matter, paper, etc., will be removed and from which the sewage will be discharged intermittently upon the fields, the flow to the proper field being controlled by gates in the gate chamber upon the discharge line."

This question was submitted to the State Board of Health and under date of April 27th, 1903, the mayor and council were notified that the Board had voted to approve their plans for a system of sewage purification by land irrigation, with the understanding that the sewerage system and sewage purification works would be constructed at the same time.

At a meeting of the Board, held June 16, 1903, this vote was confirmed by a *viva voce* vote.

REPORT ON PROPOSED SEWERAGE FOR PERRYSBURG.

The village of Perrysburg, Wood County, presented plans for a sewer system proposed for Sewer District No. 2 in that village, as prepared by F. Wenz, engineer. The plans showed a main sewer with the laterals for the territory embraced between Louisiana Avenue and East Boundary Street, and between Seventh Street and Front Street, the main sewer to be a 30-inch pipe and to discharge into the Maumee River at the foot of Maple Street. No provision was made for purification of the sewage at the present time. The mouth of the proposed sewer would be about eight, or possibly nine, miles above the intake of the Toledo water supply.

The question of approving sewerage for this district was submitted to the State Board of Health, and on February 9th the mayor and council were notified that the Board had voted to disapprove these plans, unless sewage purification works satisfactory to the State Board of Health should be introduced as a part of the proposed sewerage system.

At a meeting of the Board, held April 8th, 1903, this action was confirmed by a *viva voce* vote.

REPORT ON SEWERAGE FOR PUT-IN-BAY.

On November 2nd, 1903, the mayor of Put-in-Bay asked the Board's approval of plans for a system of sewerage for that village. The plans were referred to the engineer, Mr. Pratt, for examination and he reported upon them as follows:

"The advice of the Board has been followed to the extent of arranging for the construction of a 10-inch sewer 1,600 feet long which is to receive the drainage from five hotels including the Beebe House and thirty cottages, containing a total of at least seven hundred, which constitute the regular summer population. During the day, however, five or six times that number are brought in by excursion boats, a large portion of which visit the hotels.

"The proposed outlet for the sewer is to be 400 feet from the northerly shore of the island, opposite the village, and but 600 feet from the water supply intake for three of the largest hotels in the corporation. The sewer is to cost \$1,900.

"It was suggested in my report of last September that the sewage be discharged on the southeast side of the island instead of the north side, as is proposed, and that water for a public supply be taken from the northerly limit of the harbor.

"If a public supply is to be installed the intake should be on the opposite side of the island from the sewer outlet. It is not of consequence

from a sanitary standpoint which arrangement is made provided the intake is placed well below the surface. Observations made by the United States weather bureau show that the current on the north side of the island flows toward the west and that on the southeast part of the island flows southwest; that is, the observations indicate that currents flow from the middle of Lake Erie toward the island, striking it at the northeast corner and there dividing; one part flowing along the northern and the other along the southeastern shore.

"The proximity of the proposed outlet to the present hotel intake is sufficient reason for condemning the plan, though so far as the creation of a nuisance to sight or smell is concerned the sewer could safely be discharged at this point.

"Therefore if the State Board of Health compels the village to construct waterworks with establishment of an intake on the south side and the abandonment of all intakes on the north side of the island, the proposed outlet should be approved.

"Under the present condition the hotel intake above mentioned must receive more or less pollution from steamers and from the buildings on the wharf near which it is located. Houses and hotels not supplied from the above intake obtain their supply from wells in limestone rock, which even with the introduction of sewers cannot be considered safe. It will be seen, then, that waterworks are necessary for the protection of the health of the summer residents and excursionists.

"It is said that the buildings furnishing the greater part of the sewage are too low to connect with a sewer running anywhere but right into the harbor on the north side, as proposed, and that no sewer can be built unless according to this plan. If waterworks are not built and the proposed outlet condemned in order to protect the present hotel supply, it would be quite possible, at a not greatly increased cost, to construct a sewer running to the southwest shore, to which as many buildings as possible might be connected and the remaining low buildings be drained into a tank from which a small pump, run for a short time each day, could raise the sewage into the main sewer.

"The approval of the present plans should depend then upon what steps are taken in the near future in regard to the construction of waterworks.

"If the present system of supply is to be continued, or if a new waterworks with intake north of the island are to be built, the proposed outlet should be disapproved and the village authorities advised to run the sewer south, pumping what sewage is necessary.

"If a new waterworks with intake on the south or southeast part are built, the proposed outlet should be approved."

A copy of this report was sent to the mayor and the hope expressed that they might so change their plans that they would meet with the approval of the Board.

At the close of the year no action had been taken by the authorities of Put-in-Bay to carry out these plans.

REPORT ON A SEWERAGE SYSTEM FOR ST. BERNARD.

Having been notified that Mr. J. A. Stewart, consulting engineer for the village at St. Bernard, Hamilton County, had prepared plans for a system of sanitary sewers for that village which the authorities wished to have approved, the matter was referred to Dr. Byron Stanton, a member of the Board, as a committee to investigate and report upon these plans. He submitted the following report:

"The village has an estimated population of 3,400, is situated immediately north of the city of Cincinnati on the east side of Mill Creek and has running through it Ross Run, a stream already much polluted with sewage from the northeastern part of Cincinnati, a condition which will within the next year be relieved by the construction by the city of a sanitary sewer paralleling the run.

"The contour of the surface is such that the village has been divided into four sewer districts, each with a separate outlet. The first will discharge into a city sewer now constructed in Mitchell Avenue that discharges into Mill Creek near Winton Place. The second, third and fourth will discharge into Ross Run until the completion of the Ross Run sewer by the city, when the village authorities will seek to obtain consent of the city to discharge into that sewer.

"There are but few manufacturing establishments in the village and as these are mostly so situated that they cannot make use of the sewers, the effluent will consist almost wholly of house sewage.

"The sewers will be from 8 to 18 inches, of vitrified pipe and will be supplied with automatic flush-tanks at the head of each branch—about 70 in all. It is proposed to construct at present only that part of the sewer lying in the Carthage Pike, the most thickly settled part of the village. This pike is to be paved with granite in the near future and as a matter of economy and for the preservation of the street the village authorities wish to put in that part of the sewer and lay branches to the curb line so that the pavement will not have to be disturbed for making house connections.

"The introduction of this system of sewers will add somewhat to the contamination of Mill Creek, a stream now greatly polluted, but a project is now on foot for an intercepting sewer to carry the sewage of the Mill

Creek watershed to the Ohio River that will probably reach completion at a not distant day. As the contamination of Mill Creek will not be greatly increased by the sewage of St. Bernard, it is recommended that the plans be approved upon the condition that when the intercepting sewer along Ross Run is completed the village shall either secure from the city of Cincinnati the right to tap said sewer and discharge its sewage into it or agree to purify the sewage in a satisfactory manner whenever such purification shall be deemed necessary by the State Board of Health."

The question of approving plans for a system of sewers for the village of St. Bernard was submitted to the Board and on August 12th, 1903, the village engineer was notified that the Board had voted to approve said plans upon the condition:

a. That when the intercepting sewer along Ross Run is completed the village shall secure from the city of Cincinnati the right to tap said sewer and discharge its sewage into it, or

b. Agree to purify the sewage in a satisfactory manner whenever such purification shall be deemed necessary by the State Board of Health.

At a meeting of the Board, held October 15, 1903, this action was confirmed by a *viva voce* vote.

REPORT ON PROPOSED SEWERAGE FOR ST. MARY'S.

At a meeting of the Board held October 15th, 1902, Mr. J. P. Force, consulting engineer, of Columbus, presented plans for a system of sewerage for the city of St. Mary's.

Dr. Frank Warner, a member of the Board, was appointed a committee to investigate said plans. Dr. Warner visited St. Mary's October 20th, 1902, and reported as follows:

"St. Mary's is a city with an estimated population of 5,830, situated at the headwaters of the St. Mary's River. The river is a small one at any time and the flow of water is insignificant in the dry seasons. The river is already badly polluted by a large strawboard works, situated in the city. The river flows through the town in a northerly direction and after making various curves, turns abruptly and enters the state of Indiana, after flowing about 41 miles in Ohio.

"The area of the watershed above St. Mary's feeding the river is 89 square miles.

"It is proposed by the plans presented by the consulting engineer, Mr. J. P. Force, to empty the raw sewage into the river a short distance north of the city, just beyond the T. & O. C. Railroad embankment. I do not believe that this would create any nuisance for the people of St. Mary's. But I followed the river down in its course for some miles and

found numerous houses not far from the small stream. I interviewed some of the farmers as to what use the stream was put. I was informed that before the strawboard works were built the stream was extensively used for watering stock of one kind and another. Since that time many have found other means of watering their stock. Even now there are many who depend upon the stream, polluted as it is and as it should not be, for this purpose. To pollute this stream still further would mean a still further polluted water for the stock to drink, aside from any nuisance the stream might become to the farmers who live near it. Again as this stream has now flowing into it the refuse of the strawboard works, the water is already deprived of its absorbed oxygen, which is a necessary constituent to the final purification of the sewage which finds its way into the stream. This would permit an extension of the nuisance necessarily entailed in oxidizing the organic matter of the sewage before its complete accomplishment. By emptying the raw sewage of the city into this small stream, with its small watershed back of it to dilute the sewage, the river would become little more than an open sewer for many miles.

"Accordingly, your committee recommends that plans for purification works, to be constructed at the same time as the building of the sewers, be required of St. Mary's; and that they be asked to present these plans along with sewerage plans for the consideration of our Board."

The Board voted to require that plans for the purification of the sewage be presented for consideration with the plans for the sewerage system, said purification works to be built at the time the sewers are constructed.

Notice of this action was sent to the consulting engineer, Mr. Force, October 29th, 1902.

At a meeting of the State Board of Health, held January 28th, 1903, Mr. Force presented plans with the following communication:

"The plans are for the purification of the sewage by the septic process followed by intermittent treatment in coke contact beds.

"The works are designed to work automatically and are of the same general design as the works recently constructed under my plans at Westerville and Delaware.

"The plan presented provides for the purification of 500,000 gallons of sewage daily at a rate of 400,000 gallons per acre on the efficient area of the contact beds.

"Automatic flood gates are provided to prevent high stages of the river from flooding the contact beds and septic tanks.

"The plan presented contemplates the construction of two-fifths of the whole plan, or sufficient capacity to purify 200,000 gallons.

"This will be ample for the initial installation as it is proposed to only sewer the central portion of the city at present."

The Board voted to approve these plans, and notice was sent to the consulting engineer, Mr. Force, February 2nd, 1903.

REPORT ON PROPOSED SEWERAGE FOR SCIO.

Application having been made by the mayor of the village of Scio for approval of plans for sewerage for that place the engineer went there August 11, 1903, and submitted the following report:

"Scio is a small village which is located in the oil region of Harrison County and has a population of about 1,000. The village is built on the two sides of a steep valley through which flows Connotton Creek, a small stream having a dry weather flow of but one-half cubic foot per second. The valley is quite narrow at the upper part of the village, but broadens out at the lower part.

"A general plan of sewerage for the village has been prepared and submitted to the Board for approval. Only a small part of the system on the south side of the creek will at present be built and on this account it is asked that the State Board of Health approve the discharge of the sewage of this part direct into the creek temporarily.

"The plan also shows an outlet into the creek from the northerly part to be used in case the State Board of Health does not require purification works. Provision is made on the plan for the collection of the sewage of most of the town in septic tanks located below the town near the eastern boundary of the corporation on land adjacent to the W. & L. E. Railroad; the effluent to be discharged into Connotton Creek. There are three small areas, however, two in the upper part of the village and one in the lower, containing about twenty-five houses which it is intended to drain directly to the creek through two outlets near Main Street and one outlet near Eastport Road. It is understood that the system is for house sewage only and that storm water will not be admitted.

As stated above the intention is to construct for the present only a small part of the system consisting of perhaps 1,000 feet of eight inch sewer on College Street to which thirty-five houses at least will connect. This probably represents a population of 150. The sewer is to be discharged directly into the creek, but is so designed that it can later be connected with a main sewer leading to the septic tanks.

It is stated by the mayor that ten or twelve houses already drain directly to the creek. Upon inspection there was no evidence of deposits caused by this discharge. The creek is said, however, to receive much pollution from the numerous oil wells in the vicinity. This oil might prevent the sewage from becoming mixed with the water of the stream as rapidly as it ordinarily would, but on the other hand the odor from the oil wells would go far toward ending the odor from the sewage if any.

"Below Scio the creek flows through unoccupied country to Connotton, a small unincorporated settlement four miles distant. Two miles farther on it passes through Bowerston, a village of six or seven hundred.

"The site chosen for the septic tanks is too near the village either for these tanks or any other kind of purification works. There appears to be a considerable quantity of sand suitable for filtration in this vicinity and it would therefore be unwise to approve of the septic tanks as a means of purification when it is possible to obtain a much more certain method.

RECOMMENDATIONS.

"The Board should approve of the general system of sewers, but disapprove of proposed method of sewage disposal.

The Board should approve the construction of the College Street sewer and allow its discharge directly into the creek until such time as in the opinion of the Board a nuisance is created.

"Upon the construction of sewers in the large area north of the creek, purification works, satisfactory to the Board, must be built."

This report was submitted to the State Board of Health and on December 5th, 1903, the mayor, Mr. W. J. Lewis, was notified that the Board had considered plans for sewerage for the village and the following action was taken:

The Board approved the construction of the College Street sewer and its discharge into the creek until such time as in the opinion of the Board some other disposition of the sewage must be made.

The Board disapproved of the construction of any other part of the sewerage system, unless sewage disposal works are introduced at the same time. The site chosen for the septic tanks was disapproved on account of it being too near the village.

The Board will require a sewage purification plant to be introduced when in its opinion this becomes necessary.

There appears to be a considerable quantity of sand suitable for filtration in the neighborhood of Scio and the Board advised that further investigation be made to see whether land suitable for the intermittent filtration of sewage is not available. At a meeting of the Board, held January 20th, 1904, this action was confirmed by *viva voce* vote.

REPORT ON PROPOSED SEWERAGE FOR SPRINGFIELD.

On November 5th, 1903, the mayor and four other officials of the city of Springfield called at the office of the State Board of Health and presented plans for proposed sewerage. On the following day the engineer visited Springfield and was shown by the mayor and city engineer the

areas which it is proposed to sewer and also the principal present sewer outlets, and submitted the following report:

PRESENT CONDITIONS.

"It is generally acknowledged even by the city officials themselves that the present conditions and arrangements of the drainage system are a disgrace to the city and a constant menace to the health of its citizens.

"The population of Springfield is 45,000 and it is estimated that from one-fifth to one-third, or 9,000 to 15,000 people, discharge sewage constantly either through public or private sewers into Mill Run or Buck Creek. There are twelve miles of public sewers, all on the combined plan, discharging into the above streams through seventeen outlets, and draining approximately one-third of the area of the corporation. Mill Run is a very small stream rising southeast of the corporation and flowing right through the most thickly built-up part of the city where it empties into Buck Creek. Some of the most important buildings are situated directly over it. A survey of this run over its course through and under the city shows that it receives not only the discharge of about one hundred and seventy-five sewers, most of which were put in by private parties on their own responsibility, but that this small stream is used as a disposal place for all kinds of garbage, rubbish, etc. There are also numerous privies built directly over it in factories under which it passes. Moreover the bed of the stream, being simply blasted rock, is very uneven so that the hollow places become filled with putrefying masses consisting of rubbish, garbage and sewage. The stench is said to be unbearable at times in the summer. The passage of this stream (at this place not in its worst condition however) directly by the kitchen door of one of the principal hotels of the place, suggested the great possibilities for enterprising flies to carry the filth of the stream into the hotel kitchen.

"The most disgusting condition, however, prevails at the lower end of the run, just before its entrance into Buck Creek, where a dam, used for power purposes, holds the water back and forms an enormous septic tank—located by the side of the principal street and for the most part uncovered. At the time of inspection though on a cold day the odor was to say the least very offensive. The stench on a hot day, especially when the water is drawn down as it is said to be frequently, must be unbearable.

"The entire flow of Buck Creek in the upper part of its course through the city is usually diverted by means of a dam into a power canal, thus leaving the natural bed of the stream for a distance of over a mile, nearly dry. Into this dry bed discharge three large sewers with the effect of causing a decided nuisance.

"The reason for this lack of proper system seems to be that for many years certain riparian owners below the city held an injunction

preventing the city from discharging sewage into Buck Creek or Mill Run. The city could build storm water drains only; but these 'storm sewers' were soon tapped by anybody who desired an outlet for his house drain so that they really are combined sewers. Moreover the passage of Mill Run under the city afforded excellent place for emptying private sewers; and nobody interfered. In spite of the fact that the injunction has been removed and that the city authorities apparently consider the discharge of sewage into Buck Creek at properly located outlets below the city unobjectionable, there seems to be no disposition on their part judging from the plans now submitted for approval, to take advantage of this and to construct an efficient system along modern lines.

"On the contrary, part of the proposed plans at least seem to be in accordance with the policy which through necessity perhaps has so long been pursued; that of disposing of the drainage and filth of part of the city at the expense of the comfort and health of the other part.

PROPOSED PLANS.

"The State Board of Health is asked to act upon three separate propositions.

"1. The State Street main sewer.

"2. The Clifton and East Street sewer.

"3. Lagonda Avenue sewer.

"The city engineer has presented the data upon which the following descriptions are based and has also prepared a plan of the city showing present and proposed sewers with the drainage areas tributary to the latter.

"With reference to the future disposal of the sewage the flow of Buck Creek was inspected at several points and judged to be less than ten cubic feet per second. A rough gauging of Mad River (which though not shown on the plans flows in a southerly direction and receives the flow of Buck Creek at a point about one-half mile west of the west corporation line) showed a flow of sixty to seventy-five cubic feet per second, although this is probably much higher than the average dry weather discharge.

"State Street sewer.—The area to be drained by this sewer, as shown on the plan, is located in the west part of the city and comprises 1,600 acres; the southerly and southeasterly parts of it are low and flat and the difficulty from wet cellars and flooded cesspools is said to have prevented the building of the best class of houses. From the center of the area northward however the ground has a fair slope and is drained naturally by a small intermittent stream called Indian Run. This run is at present used as a general receptacle for rubbish and also receives the sink drainage and sewage from a large number of houses. These conditions not

only create a nuisance along the course of the stream, but at time of heavy rain the filth is washed along as far as Snyder Park, a public park bordering Buck Creek, where a large portion of it remains to decompose.

"The State Street sewer drainage area contains a total population of 5,500 or less than four persons to the acre; this means that a large part is vacant land and none is thickly populated. The occupied parts contain chiefly a medium class of dwellings each provided with a good sized yard.

"The proposed sewer is to be of brick, five feet in diameter and some two miles long. Besides surface and subsurface drainage, it will receive the sewage of 2,500 people as soon as completed, while it is estimated that when the territory is well built up there will be a population of 20,000 draining into it. The plan shows two possible outlets, one into Buck Creek at the mouth of Indian Run and within the limits of the above mentioned Snyder Park, and the other into the same stream at the foot of Main Street. On account of the much greater expense of the latter route, the first is more favored by the city authorities although much local opposition is expected on the part of the park board. The Main Street route would however give sewerage facilities to a larger number of people.

"The flow of Buck Creek at either of these locations would probably be sufficient for the largest part of the time to care for the sewage of 2,500 people. But there would possibly be times when the flow would be insufficient to entirely conceal the effects of the sewage; a condition highly undesirable at a public park (route No. 1), but which might be allowed at the foot of Main Street (route No. 2). Moreover the flow of this stream is likely to be seriously reduced by being drawn upon for waterworks purposes above the city as there has just been introduced a new scheme of obtaining a supply by flooding a gravelly plain and drawing off the water to a well by means of underdrains. Again during part of the day the water may be held back for power purposes. But the most important consideration is the great desirability of building sewers in this district as part of a general system of domestic sewers which will surely have to be built some time and which are necessary at present.

"It would seem as if, that, aside from all question of disposal, the construction of a large brick sewer at a cost of over \$150,000, principally for the removal of surface and ground water from an area which is so sparsely populated and one which is already provided in part with a natural water course, were unnecessary; that the drainage problem for this territory could be better solved by a system of sanitary sewers, provided with underdrains of sufficient size not only to protect the sewers from receiving much infiltration water or 'leakage' but also to furnish a means of disposal for drainage of wet lands, for roof and cellar water,

and where necessary, for surface drainage also; the last to be admitted only through properly constructed catch basins. These underdrains could discharge into Indian Run at various points after it has been thoroughly cleaned and would therefore in no case have to be of very great size.

"Furthermore the mixture of sewage with a considerable quantity of ground water as would here be the case has in many instances produced an extensive fungus growth, in the sewers, known as '*Leptomitus*', a tough slimy organism which grows in masses having the appearance of pieces of sheep skin attached to the sides of the sewer. This growth, where it occurs, decreases the capacity of the sewer and causes deposits; and the detached pieces flowing along with the sewage, make disposal either by dilution or purification more difficult.

"Clifton and East Street sewer.—This sewer is about one-half mile long and is intended to drain an area of 400 acres in the southeastern part of the corporation and discharge into Mill Run above the city. It would be built principally for the surface and subsurface drainage, but would receive immediately the sewage from 700 people while the number in the future is estimated at 10,000. The present total population is about 2,500.

"This district appears to be badly in need of drainage, but the present plan if carried out would cause further pollution of the already disgraceful Mill Run and further would not be in accordance with the general plan for the city.

"As a drain for storm and ground water only this sewer should be approved provided that the condition of Mill Run be improved and its carrying capacity increased in order to prevent the re-occurrence of floods in the main part of the city with the consequent conveying of more or less filth into cellars and streets. This improvement is already being contemplated.

"Lagonda Avenue sewer.—The exact size of the proposed sewer is not given, but it is to be a fairly good sized brick sewer about a mile long and is to drain a territory of 630 acres which contains a present population of about 3,500; 1,000 of whom will connect with the sewers at once while the future contributing population is estimated at 12,000. This district lies in the northeastern part of the city and is adjacent to Buck Creek. The ground is largely low and swampy and owing to the little fall available the sewer will have to slope in two opposite directions, both parallel to the creek, and discharge at two separate outlets. Both of these outlets are located below the dam which as mentioned above diverts the entire flow of the creek; so that the sewage would be discharged at nearly all times into a dry stream bed and would add seriously to the nuisance existing just below this locality from like conditions.

"It is evident that the need of surface and subsurface drainage is urgent, but it would be contrary to the first principles of sanitation to allow the discharge of sewage as proposed.

"It has been suggested by the city authorities that the water right above this outlet be purchased and the stream allowed to flow in its natural bed. Although this would improve the condition to a large extent at this particular locality it would not be in accordance with providing proper permanent disposal for the entire city.

CONCLUSIONS.

"1. Regarding the State Street sewer: Although the present quantity of sewage which would come from this area could be discharged into Buck Creek at Main Street, or possibly at Snyder Park without creating a nuisance, the indications are that the rapid increase in the proportion of sewage to creek water will in the future create less favorable conditions; the construction of a large brick sewer is not the best solution of the drainage problem for this area; discharge of sewage through a combined sewer outlet either at Snyder Park or Main Street would, when this outlet became a nuisance, be much more difficult to prevent than would the discharge of the same amount of sewage through a sanitary sewer so arranged as to provide for future connection with an interceptor. If the city agrees to install a complete system of sanitary sewers within a reasonable time, the discharge of the sewage of this district into Buck Creek through sanitary sewers pending the completion of a general system might be allowed.

"2. As to the Clifton and East Street sewer: Further discharge of the sewage into Mill Run should be prohibited; but this sewer may be approved as a drain for storm water only, provided that the carrying capacity of Mill Run is made sufficient to properly take care of its present wet weather flow and also of the additional flow from this area.

"3. The Lagonda Avenue sewer under the present plan should not be approved; but as a drain for storm water and ground water there would be no objection to approving of its discharge into the dry bed of Buck Creek.

"4. The city of Springfield having a population of 45,000 cannot under even the most favorable conditions regarding location of outlets, depend for a means of sewage disposal upon Buck Creek, a stream having a watershed of only a hundred square miles and a dry weather flow of probably not more than ten or fifteen cubic feet per second. All future sewers should be built therefore on the separate system with reference to future treatment of the sewage; and they should also bear their proper relation to a general plan which should be made in order to provide an

efficient system for the whole city including that portion already having combined sewers.

"5. The permanent discharge of sewage into Mill Run or Buck Creek should not be permitted, and its discharge into Mad River should be allowed only upon the condition that the city install purification works when deemed necessary by the State Board of Health."

The report of the engineer was submitted to the State Board of Health and on December 4th, 1903, the mayor, Hon. Charles J. Bowlus, was notified that the Board had voted to approve plans for the State Street sewer provided it be used for storm water purposes only and that a sanitary sewer be constructed at the same time for this district with a temporary outlet to Buck Creek.

That the plans for the Clifton and East Street sewer and for Lagonda Avenue sewer had been disapproved.

He was also notified that the Board urged upon the officials of Springfield the importance of making provision in the near future for a comprehensive storm and sanitary system of sewers with the collection of the sewage at some proper point where when necessary sewage disposal works might be constructed. At a meeting of the Board, held January 20th, 1904, this action was confirmed by *viva voce* vote.

REPORT ON PROPOSED SEWERS FOR THE CITY OF TOLEDO

At a meeting of the State Board of Health held January 28th, 1903, plans for a main sewer in sewer district No. 37 of the city of Toledo with an outlet into the Maumee River at the foot of Columbus Street were presented, and the city engineer was notified on February 2nd, 1903, that the plans for a main sewer in this district had been approved.

On August 21st, 1903, an application was received from Dr. Chapman for the approval of a sewer in sub-main district No. 1 of main sewer district No. 16 with an outlet into Ten Mile Creek or Ottawa River which had been submitted to him by the board of public service of the city of Toledo.

The question of approving this sewer outlet was submitted to the Board, and on August 29th, 1903, the board of public service was notified that the State Board of Health had voted to approve of plans for this district.

At a meeting of the State Board of Health held October 14th, 1903, the chief engineer of Toledo presented plans for sewers for that city. These plans were referred to Dr. W. C. Chapman, member of the Board at Toledo, for investigation and report. Dr. Chapman reported as follows:

"I have investigated the proposed sewer districts Nos. 26, 27, 40 and 39 for the city of Toledo. Nos. 26, 27 and 40 are short combined sewers and will largely be used for storm water, although house sewage will be carried to some extent. The outlets of the three will be into Ten Mile Creek, also called Ottawa River. It empties into Maumee Bay quite a distance below the city and will not likely pollute the water into which it flows to any appreciable degree. I would therefore report favorably upon the proposition giving permission to build the sewers, provided that if in the opinion of the State Board of Health the outlets of said sewers become a nuisance and a menace to the community purification plants must be installed.

"In regard to sewer district No. 39, it is proposed to construct a large combined sewer, the main being 93 inches in diameter. The chief purpose is to drain a large tract of land, which is more or less submerged a great portion of the year. The sewer diminishes as it extends from the outlet through a sparsely settled section. The whole sewer is on the outskirts of the East Side, being on the east side of the river. There is possibly a population of five or six thousand to be benefited by the sewer. At the head of one of the laterals a manufacturing community is rapidly growing, and it is positively necessary to give drainage. The expense will be great for so large a sewer, but a smaller one will not carry off storm water with sufficient rapidity. The proposed outlet will be about two miles below the intake of our waterworks, and on the opposite or eastern side of the river. I do not believe the river water will be polluted to a sufficient degree to make it detrimental to health by the discharge from his sewer. It will be a number of years before there will be a large population to be served. If purification is now insisted upon the proposed improvement must be abandoned. The large dilution which will always be present will to a great degree prevent dangerous pollution.

"I report favorably upon the proposition permitting the construction of the proposed sewer, with the proviso that if in the future examination of the water near the outlet, such examination to be made by the State Board of Health, shows dangerous pollution a purification plant must be at once installed."

The question of approving sewers for districts Nos. 26, 27, 40 and 39 of the city of Toledo was submitted to the State Board of Health, and the following letter of conditional approval was sent to the chief engineer of the board of public service October 29th, 1903:

"You are hereby notified that the Board has approved the plans for districts Nos. 26, 27 and 40, with outlets into Ten Mile Creek, or Ottawa River, upon the condition that if in the opinion of the State Board of Health the outlets of said sewers become a nuisance and a menace to the health of the community, purification plants shall be installed.

"The Board also approves the plans for sewer district No. 39, with an outlet into the Maumee River about two miles below the waterworks intake, upon the condition that if in the future examination of the water near the outlet, made by the State Board of Health, shows dangerous pollution a purification plant shall be at once installed.

At a meeting of the State Board of Health held April 15th, 1903, this action was confirmed by a *viva voce* vote.

REPORT ON SEWAGE DISPOSAL FOR THE TOLEDO DETENTION HOSPITAL.

At a meeting of the Board held on October 15th, 1902, the health officer of Toledo, Dr. W. W. Brand, presented plans for the disposal of the sewage from the detention hospital of that city, with an explanatory communication from the first assistant engineer.

The Board considered the plans and voted to approve them, and Dr. Brand was so notified October 20th, 1902.

At a meeting of the Board held January 28th, 1903, Dr. Brand presented plans, for a similar plant, which they wished to substitute for those already approved.

The Board approved these plans and notice of this action was sent to Dr. Brand on February 2nd, 1903.

REPORT UPON PROPOSED SEWERAGE FOR TROY.

The application of the city of Troy, Miami County, for approval of proposed plans of sewers, to discharge into the Miami River, having been, at the last meeting of the Board, referred to Dr. Stanton for report, he visited that place February 3rd and in company with Mr. Force, the consulting engineer, went over that part of the route lying between the city and the proposed outlet at the Miami River, a distance of over one mile, and made the following report:

"The sewer system is for sanitary purposes only and the part that it is now proposed to build will consist of about seven miles for the business portion of the town, including the trunk sewer and the laterals, though plans for twenty-four miles in all are prepared. It is not the expectation that more than the seven miles now proposed will be required for many years, but the trunk sewer, from the nearest city street to the outlet, will be of such capacity as to suffice for the whole system when completed. The nearest street of the city, as now platted, is 5,300 feet from the outlet and the nearest house to the outlet is over 300 feet

distant. The discharge will be into running water as the channel of the river for some distance above and below is near the proximal shore.

"Should sewage purification ever be required the proposed sewer outlet is near the most advantageous site. The sewer system will be supplied with automatic flush tanks at the head of every lateral, thirty-three in all being called for.

"As the Miami River is not the source of any public water supply below Troy, I would recommend that the plans be approved subject to the same conditions as were imposed upon the city of Middletown in 1896, viz., that the city will agree to purify its sewage in a manner satisfactory to the State Board of Health whenever such purification shall be deemed necessary by said Board."

The Board considered these plans for a sewerage system for the city of Troy and on February 13th, 1903, Mr. J. P. Force, consulting engineer, was notified that the plans had been approved subject to the provision that the sewage should be purified in a manner satisfactory to the State Board of Health whenever this might be deemed necessary as determined by the Board.

At a meeting of the Board, held April 8th, 1903, this action was confirmed by a *viva voce* vote.

REPORT ON PROPOSED SEWERAGE AND SEWAGE DISPOSAL FOR WADSWORTH.

Application having been made by the village of Wadsworth for approval of plans for sewerage and sewage disposal for that place the engineer went there on November 25, 1903, looked over the plans and locality and submitted the following report:

"A report on sewerage and sewage disposal for the village of Wadsworth together with plans have been submitted to the Board for approval. It is proposed to build at present but one-half of the disposal plant as designed.

"The sewers seem to be well designed and of a sufficient size to provide for the needs of the village for a long time.

"The proposed location of the disposal plant is not entirely satisfactory on account of its proximity to the road and to two houses on the opposite side of the road a few hundred feet distant; but it seems to be the best location available without greatly increased cost. The above two houses are of a cheap character and could be bought by the village if necessary for no very great sum.

"A sample of sand No. 2, of which the filters are to be built, was submitted to your engineer and found to be of the same size as stated in the report of the designing engineers.

"The area of one acre proposed for the completed plant is not sufficient to purify the sewage of the whole town, unless the preliminary septic treatment is unusually successful in preparing the sewage for filtration. One-half of the plant built according to the plans proposed, however, could take care of the sewage of the village for the next two or three years; considering the present inefficiency of the water supply and also the fact that few sewers will be built at once.

RECOMMENDATIONS.

"1. The system of sewers should be approved.

"2. The location of the disposal plant should be approved as it is the most feasible under the circumstances.

"3. The scheme of building one-half of the disposal plant at present should be approved, provided the remainder be built when deemed necessary and be made to include as much filtering material as is deemed necessary by the Board."

The question of approving plans for a system of sewers and sewage disposal for the village of Wadsworth, as prepared by Snow and Barbour, consulting engineers, was submitted to the State Board of Health, and on December 9th, 1903, the mayor and council were notified that the Board had voted to approve these plans, subject, however, "to the provision that additions shall be made to the sewage disposal plant whenever it may be deemed necessary and that such additions shall include as much filtering material as the Board may require." At a meeting of the State Board of Health, held January 20th, 1904, this action was confirmed by *viva voce* vote.

REPORT ON PROPOSED SEWERAGE FOR WARREN.

Application having been made by the board of health and city engineer of Warren for approval of a proposed change in outlet of the so-called Freeman Street sewer to a point below the waterworks dam at West Summit Street bridge and for proposed additions to the sewer system as indicated on map accompanying the application, the matter was submitted to the State Board of Health in session October 14th, 1903.

The city engineer was notified October 16th, 1903, that the State Board of Health had voted to approve of changes in and additions to the sewer system of Warren as indicated upon map received with application October 6th, 1903.

REPORT ON PROPOSED SEWERAGE FOR WINTON PLACE.

It was learned that the village of Winton Place proposed to construct a sewer system, and the attention of the village authorities was called to the law requiring the approval of their plans by the State Board of Health.

In reply the mayor wrote as follows:

"Winton Place, O., August 21st, 1903.

"C. O. Probst, M. D.,

"Dear Sir:—Your communication of the 19th instant, relative to the system of sewerage proposed to be installed by the village of Winton Place, is at hand.

"I will submit the same to the council at the next meeting. I would further state, however, that it is our intention to submit the scheme to the State Board of Health, and in every other respect to conform to the law.

"In considering, as an individual, the sewerage necessities of Mill Creek valley, I am decidedly of the opinion that the most important accessory is a trunk sewer that will provide facilities for the carriage of all the sewage of the entire watershed of Mill Creek valley to the Ohio River. Mill Creek drains about .37 of the entire area of Hamilton county, and it is an absolute impossibility to carry the storm water of this area to the Ohio River through any other channel than the natural waterway of Mill Creek.

"Only the sewage can be contained in a sewer. As you are aware the old time villages of Clifton and Avondale have the so-called sanitary system of sewerage and discharge their output openly into the channel of Mill Creek. So also that portion of the city of Cincinnati, known as Cumminsville, discharges into Mill Creek. This latter exceeds the two first named districts in amount perhaps 400 per cent. From that point onward to the Ohio River it skirts the western edge of Cincinnati, and water of Mill Creek is fearfully foul and is growing more so every passing year; in fact during the summer time Mill Creek is one long drawn out 'stink'.

"Fortunately there are one or two inflows from the Miami Canal that help, to a limited degree, to flush the channel. It must not be forgotten that during the summer droughts it is only this inflow that renders such a condition of affairs in any degree bearable.

"The population of Mill Creek valley is increasing rapidly and the number of people draining into Mill Creek at this date, including the Cumminsville portion, must be nearly 50,000.

"The only remedy for present troubles and future unsanitary conditions, with its sure attendant evils, is to construct a trunk sewer.

"For years the city of Cincinnati has talked of it, and has quieted efforts to publicly insist upon it by the statement that they are considering it and making plans for it, etc.

"If the State Board of Health has the power or influence to cause the city of Cincinnati to construct a trunk sewer they should immediately move in this matter and thus remove the menace to health and life of all within its scope.

"We will at the earliest opportunity forward a full and complete statement of the proposed system to your honorable Board.

[Signed] "Very truly,
"SAMUEL HANNAFORD,
"Mayor of the Village of Winton Place."

Later Mayor Hannaford sent in plans and specifications of the proposed system, and the following communication from the consulting engineer:

"Cincinnati, Ohio, August 26th, 1903.

"Louis G. Dittoe, Corporation Clerk, Winton Place, O.

"Dear Sir:—Before reporting to council the present plan for sewers in Winton Place I conferred with Mr. Stanley, chief engineer of the board of public service of this city, regarding the proposed trunk or intercepting sewer now being planned for Mill Creek valley. Mr. Stanley has had levels taken along the valley several miles above Winton Place. While his plans and grades have not been definitely fixed, he is clear upon two points: First, the line within and opposite Winton Place will be in Spring Grove Avenue; second, the grade will be more than twelve feet below the present surface of that avenue.

"I have regarded these as essential points in planning the outlets for your sewers because at the present time the only possible outlets are into the channel of Mill Creek. But they should be so planned as to admit of being readily connected with the trunk sewer when it shall have been constructed. This has been done, as each outlet passes directly across the line of the proposed trunk sewer, at an elevation materially above its projected grade, has no connections after crossing that line, and thus admits of easy connection with it.

"On the blue print of your general plan, which I hand you herewith, I have indicated about the line of the trunk or intercepting sewer, as obtained from Mr. Stanley, thus showing graphically the facts above stated.

"As to contaminating the water of Mill Creek the small quantity of sewage that will reach it from the village of Winton Place, as compared with the great quantities projected into it from other sources, will not have an appreciable effect upon the contents of the stream. The one sewer outlet which the city constructed a few years since, leading from Corryville district past the Zoological Garden, down the Carthage Pike

and discharging into Mill Creek just below Mitchell Avenue, brings to the stream a volume of sewage more than twenty times greater than can possibly be obtained in the entire village of Winton Place. Then the Ross Run district, coming into the stream a mile above Winton Place, drains a territory and serves a population more than five times as large as the Carthage Pike sewer. Then the stream carries the offal from all of the factories and villages above Winton Place, so that the small quantity of contaminating matter that can reach it from the village can have no appreciable effect upon its waters. We all want it bettered and while it has become essential to provide sanitary conditions for our own dwellings we must plan the outfall so that it will be taken by the trunk sewer that must, by some means, soon be constructed down the valley.

"Very respectfully yours,

[Signed]

"M. D. BURKE,

"Consulting and Civil Engineer."

The matter was submitted to the Board, September 3rd, and the temporary outlet into Mill Creek was approved with the proviso, that whenever a trunk sewer shall be constructed to carry off the sewage now entering Mill Creek, said trunk sewer will be made use of as an outlet for the sewage of Winton Place. The authorities were notified of this action September 9th, 1903.

At a meeting of the Board, held October 15th, 1903, this action was confirmed by a *viva voce* vote.

REPORT ON A PROPOSED SEWER SYSTEM FOR YOUNGSTOWN.

The city of Youngstown, through its engineer, Mr. F. M. Lillie, made application for the Board's approval of plans for a new sewer system. Mr. Hartzell, member of the Board, was appointed to make the necessary investigation and report. Mr. Hartzell visited Youngstown on September 10th, 1903, and after becoming acquainted with the details of the plan, accompanied by the engineer and three members of the board of public service, inspected the district to be sewered and the point at which the outlet into the Mahoning River is proposed to be located, and reported upon the plans as follows:

"The district, No. 7, is at the extreme eastern end of the city. The sewage could not be delivered into already existing sewers without pumping. Rapid growth in population necessitates prompt action. In respect to topography the entire district offers very favorable grades for the prompt removal of the sewage. The slope of the laterals is in the direction of the main which in its course nearly parallels the river, and which

thus assumes the form of an intercepting sewer. The combined system is employed.

"The main is 4,600 feet long. The 1,800 feet at the upper end will be of 18-inch pipe; thence onward the material will be of brick with increasing capacity, the greatest diameter being 4 feet.

"While storm water is admitted into the sewer the following device will be used for the purpose of separating the normal flow of sewage proper from the flood waters, and delivering it separately, in view of the possible future requirement of purification. Commencing at a point 700 feet above the mouth of the main sewer a 20-inch pipe will be laid 3 feet under the bottom of said main. At said point, and at the bottom of a manhole, the main sewer will be cut vertically for a space of about a foot, or such width as experiment shows to be needed. Through this slit the dry-weather sewage will fall down and be conducted away in its own channel. The flow of flood-waters which, owing to the grades must be quite active, will bridge the opening and escape by the larger outlet. This outlet is into Dry Run about 1,000 feet above its confluence with the river. This run is never dry; it drains considerable territory and is subject to severe fluctuations.

"The sanitary pipe-sewer also discharges into Dry Run, but at a point about 700 feet below the mouth of the storm-water opening. The mouth is under a very long stone-arched railroad bridge, and is several hundred feet from the river. Between the bridge and the river the grounds are submerged in high water and are uninhabitable.

"The bottom lands on both sides of the Mahoning below Youngstown are generally subject to overflow and are not used for residence purposes. Youngstown is about six miles from the Pennsylvania line. I was informed that the nearest town below using the water was Beaver Falls, Pa., about 50 miles distant. Wellsville, the nearest point in Ohio, is more than 100 miles by the river route, and that municipality has been taking steps toward the abandonment of raw river water. The intake of the Youngstown city water supply is about two miles above the proposed outlet.

"The main sewer of Youngstown discharges into the river a few hundred feet below the water intake. The sewage of Warren, and probably some smaller places, reaches the river above Youngstown. Two effluents only are purified; that from Alliance by chemical precipitation, and that from the Trumbull County Infirmary by the septic tank process.

"The Mahoning is a seriously polluted stream. Constant additions are being made to the very large industrial works that line its banks. All of these use enormous quantities of water which finds its way back into the channel. In view of these facts, and of the alarming prevalence of typhoid fever, it was encouraging to be assured that the authorities have finally and fully agreed that the city water supply shall be properly fil-

tered. The problem has been submitted to competent hands and the plan of filtration will be completed within a short time.

"The further pollution of the river should be prevented by every possible and rational requirement, especially if there was a serious menace to riparian interests below. For the reasons stated the menace from the proposed sewer is without significance. Owing to the great height reached by flood waters any system of purification would reach the prohibitive point. Besides, if purification is adopted it should comprise the effluent from the city's main sewer.

"Being of the opinion that in delivering the normal flow of sewage in a separate conduit the city has done all that should be required for the district in question at the present time, your committee recommends approval of the plan submitted, provided that satisfactory purification shall be installed when deemed necessary by the State Board of Health."

The question of approving plans for sewer district No. 7, of Youngstown, was submitted to the Board, and the city engineer was notified on September 22nd, 1903, that the State Board of Health had voted to approve their plans for this district subject to the condition "that satisfactory purification shall be installed whenever deemed necessary by the State Board of Health." At a meeting of the State Board of Health in October, this approval was confirmed by *viva voce* vote.



MISCELLANEOUS REPORTS.

REPORT OF AN INVESTIGATION OF AN ALLEGED NUISANCE AT CHICAGO.

On July 13, 1903, the following complaint was received from residents of the village of Chicago:

"We, the committee duly appointed by the board of the respective churches named below, desire to inform you concerning a certain ditch located in the village of Chicago, Huron County, Ohio. These churches and the parsonages are located contiguous to this ditch, which ditch is used as a public sewer; there being now emptying into it the wastes and slops of four saloons, and from sixty to ninety bath tubs and private drains; and located upon its banks are twelve barns and stables, and thirty-eight privies and cesspools. The stench is an intolerable nuisance to residents and an annoyance to congregations, and we believe it to be a menace to the public health. We earnestly request that you visit Chicago, Ohio, at your earliest convenience and advise, or take such action as seems necessary."

Dr. Chapman, a member of the Board, made an investigation of this complaint August 20th, and submitted the following report:

"I have visited Chicago Junction in accordance with request and examined the source of trouble there. Citizens complain of a nuisance arising from a small stream which passes through the village as an open ditch. This ditch is nearly an open sewer, water flowing at all times but carrying with it the sewage of a good portion of the village; drains being connected at many cross streets. The B. & O. railway company used this little stream for supply to their engines by throwing a dam across the outlet some thousand feet below the village so forming a reservoir; water in it varying from four feet in depth in dry season to ten in rainy times. The water was used by the company years before the village was built on the banks. Therefore, the water was not polluted. The question is a complicated one as the village has contaminated the water by establishing a sewerage system running all the wash from water closets, privies, saloons and kitchens into the open drain.

"To remedy the matter it will be necessary to build a sewer at least three feet in diameter to a point removed from the present outlet and there disposed of.

"The railroad company will not allow of the cutting off of their supply of water; as it has been determined by their engineers that the pollution has not so changed the water as to make it unusable for steam purposes, and, as the only route by which sewers can be built must be through its property the request has been refused, unless the pure water is per-

mitted to run into the reservoir and not used by villagers to work through a sanitary sewer.

"I would suggest that you correspond with the B. & O. officials; get an expression from them, if possible, what they will do, declaring the reservoir a nuisance and that it must in some way be abated. Also let the health officer of Chicago Junction know that our Board will endeavor to help the corporation in every way possible."

The attention of the general superintendent of the B. & O. R. R. was called to this report with the request that the matter be given immediate attention. No further complaints have been received.

REPORT OF COMMITTEE OF THE OHIO STATE BOARD OF HEALTH ON THE TYPHOID FEVER EPIDEMIC IN CLEVELAND.

At a meeting of the Ohio State Board of Health, held in Columbus, April 8th, 1903, Dr. W. T. Miller, of Cleveland, a member of the Board, called attention to the unusual prevalence of typhoid fever in Cleveland. He stated that there had been more than one thousand cases during the preceding six weeks.

At the meeting above referred to Dr. Friedrich, health officer of Cleveland, said that the deaths from typhoid far outnumbered those from smallpox which had been rife in that city.

While recognizing its powerlessness to apply, or even to suggest, any immediate remedy for this very unfortunate condition, the Board nevertheless deemed it advisable to appoint a committee for the purpose of reviewing the probable cause of the epidemic; also, if possible, of suggesting steps that might rationally be taken in abatement of such causes.

POLLUTION OF WATER SUPPLIES.

In his enumeration of the things which modern exactions of wealth, coupled with municipal carelessness and corruption, have done for American cities, Bishop Spaulding, of Peoria, Illinois, says in a late address:

"It has defiled our rivers until in our cities today a thirsty man may not get a glass of cold water that is fit to drink."

It is more than probable that intelligent investigation would fix the culpability for the prevalent disease in Cleveland upon a polluted water supply. When this supply was first introduced, many years ago, the lake was comparatively free from contamination. But every one knows the power of habit. Day after day the use of the lake water, and the gradual-

ly increasing pollution of it, has gone hand in hand. Persons accustomed to pure water could not, suddenly, face the necessity of taking this water into their mouths without a feeling of disgust.

Many of the largest cities now filter their water. By this means London, for example, provides a water from a densely populated region of such quality that typhoid fever has well nigh disappeared. Not only is the water filtered, but the sources are protected. Mr. Allen Hazen's "Filtration of Public Water Supplies" says: "Boats on the River Thames are not allowed to drain into it, but are compelled to provide receptacles for their sewage, and facilities are provided for removing and disposing of it. As an additional precaution no boat is allowed to anchor within five miles of the intakes." The low death-rate of London is susceptible of rational explanation.

THE LOCAL SITUATION.

At a recent meeting in Cleveland, the local situation was summarized by Dr. William T. Miller, chairman of a committee for the investigation of the typhoid epidemic, as follows:

"The city of Cleveland, with 381,768 people, on the southern shore of Lake Erie, at the mouth of the Cuyahoga River, has its intake water pipe, one and one-third miles from the shore, and one-half mile west from the mouth of the river. The prevailing currents of the lake at this point are eastward, yet a south wind will frequently drive the water near the shore in a westerly direction, so that the sewage from the river will travel at times towards the intake. Our sewerage system is a combined sanitary and storm water system with numerous outlets into the river and along the shore of the lake east and west.

"The chief sewer on the west side, that of Waverly Avenue empties into the harbor east of the west arm on the breakwater. This was found to create a nuisance, that part of the harbor forming a vast settling basin or septic tank, in which the sewage underwent putrefactive changes and gave rise to noxious odors. This proving a nuisance, the west arm of the breakwater was opened to the extent of two hundred feet, and now there is a movement of the current from the mouth of the Waverly Avenue sewer through the break in the harbor wall westward in the direction of the intake pipe at the rate of about thirty feet per minute, as shown by the drift-wood on the surface, so that in a few hours after the sewage is discharged at the foot of Waverly Avenue, it is taken into the intake pipe and distributed throughout the city for drinking purposes.

"The history of typhoid in the city for the last five years shows deaths in 1898, 121; in 1899, 119; in 1900, 205; in 1901, 140; in 1902, 136; in 1903 from January 1st to April 17th, cases 1,393, deaths 145. This is a total mortality in five years of 906. This mortality based upon eight per

cent fatality, using therefor a multiple of $12\frac{1}{2}$ would be 11,225 cases during the past five years.

"The most convincing chemical evidence of water contamination is the amount of chlorine it contains unless this can be explained by natural conditions—salt springs, etc. The chemical analysis of the water during the past fifteen years, as made by Professor Smith, of Case school, shows a very marked progressive increase in the amount of chlorine as shown by the following table:

Parts per Million.

Spring, 1887.....	2.8
Spring, 1888.....	2.8
Spring, 1889.....	3.3
Spring, 1890.....	4.3
Spring, 1891.....	5.9
Spring, 1892.....	5.8
Spring, 1893.....	6.0
Spring, 1894.....	6.6
Spring, 1895.....	7.5
Spring, 1896.....	7.4
Spring, 1897.....	8.0
Spring, 1898.....	8.3
Spring, 1899.....	8.8
April, 1900.....	9.3
February, 1901.....	10.5
March, 1902.....	12.2
December, 1902.....	11.7

By a Cleveland paper of June 11th it appears that the sewers are not only sources of pollution, but that the garbage of the city and its environs is also dumped into the water supply.

In another Cleveland paper of the same date, June 11th, we read, "The Board of Health will soon take action about the Lakewood sewer, which empties into Rocky River. Unless the village remedies the cause of complaint the State Board of Health may be appealed to." And in the columns of the same paper is printed this paragraph: "Up to yesterday noon forty-nine new cases of typhoid fever had been reported to the health office for the present week. Last week during the entire seven days only forty-eight new cases were reported. The indications point to a decided increase this week." The report's prophecy of a "decided increase" of cases seems to have been fully verified, for in the same paper of the 15th of June is printed the following: "Typhoid cases increased from forty-eight last week to one hundred and thirty-six this week, an advance of nearly 200 per cent. There were thirteen deaths from the fever. The death rate this week reached 112, being 29 more than the corresponding week last year. The total number of contagious diseases was 176. This was 23 more than the same week last year, when the smallpox epidemic was at its height."

Repeated microscopical examination of the water during a series of years has shown the constant presence of intestinal bacteria. This is evidence sufficient to prove the dangerous contamination of the water by sewage.

The remedy now being provided is the extension of the waterworks intake pipe out beyond the supposed area of sewage contamination and the completion of the intercepting sewer, which will collect the sewage and deliver it at a point ten miles eastward. While this will remove the danger to a large degree, it is the opinion of your committee that it will not guarantee the people a pure water supply. It is therefore recommended by your committee that the city appoint a water commission to proceed at once to the consideration of plans for the purification by filtration of the water, and that meanwhile the public boil and filter all lake water used for domestic purposes; and that those having the care of fever cases exercise great care in sterilizing the discharges.

In support of this recommendation a few comparative statistics are offered. Berlin with a population of 1,708,500 people, had a death rate in 1898 of 73 from typhoid fever. The water supply for Berlin is from the river Spree, at Muggel, the watershed being 2,800 square miles with a population of 133,000. The water for Berlin is purified by sand filtration. While the average bacteria in the water before filtration is something over ten thousand per cubic centimeter, 99.6 per cent are removed by filtration. Philadelphia with a population of 1,060,954, had a death rate from typhoid fever in 1898 of 900, 110 of whom were soldiers. The water supply of Philadelphia is from the Schuylkill and is delivered without purification. Hamburg, Germany, population 641,780, had a death rate in 1898 of twenty from typhoid fever. The deaths from typhoid fever in 1887 were 572. The water supply is derived from the river Elbe. Filtration plants were established in 1894 with the result as above shown.

HISTORIC.

In the annual report of the Ohio State Board of Health for 1886 is printed a paper on the "Sanitary History of Cleveland" by Dr. G. C. Ashmun. Already at that date he reviews the question most pressing at the present time: "How shall Cleveland obtain and maintain a pure water supply from the source so abundant and so near, and still use Lake Erie as a receptacle for all the excreta and waste substances from a large city? Can these two demands on the lake be rendered and kept compatible with the health of the people so using it?"

Concerning the river harbor at that time he says: "The condition is one of stagnation and deposit, with decomposition and effluvia causing the boatmen and others engaged in business along the river nausea and often vomiting. People crossing the bridges, especially at night (in the

summer), pass through a vapor loaded with the gases from the substances decomposing in the river below. These substances come from oil works, slaughter houses, soap works, tanneries, breweries, sewers and other drains. When large rainfalls occur, the river is flushed and the deposit of weeks or months is carried into the lake. The problem presented for the relief of this condition is simply one of engineering, and must be met and solved very soon or dire results to life and health may follow."

Needless to say here that the "dire results" thus predicted seventeen years ago have followed time and again. Present conditions show that, far from showing any tendency to abatement, they actually increase in intensity from year to year.

It is proper to add here that in the annual report of the Ohio State Board of Health for 1901, Benjamin H. Flynn, engineer of the State Board, presents a resume of the sources of pollution affecting water supplies taken from Lake Erie. He quotes the report of the U. S. Deep Waterway Commission on the action of the winds showing that while the total movement to the east is much greater than the movement to the west for more than 16 months in the five years from 1891 to 1895, the wind blew from the east. He concludes: "When (by such wind movement) therefore, there is opportunity for sewage reaching the waterworks intake, the only hope of immunity from polluted water is to employ some reliable method of purification, and to maintain this system at a state of efficiency sufficiently high for the results that ought to be obtained."

ACTION OF THE STATE BOARD OF HEALTH.

By the terms of an Ohio law, passed in 1893, no public waterworks or sewerage system can be constructed, or changed, without first having the approval of the State Board of Health. The following year the plans of a sewer system for the west side of Cleveland were submitted for approval. The Board refused its sanction on the ground that the discharges from the proposed sewer would pollute the city's water supply. The city's representatives were advised that the sewer could be approved only upon the condition that the city water was satisfactorily purified.

It was urged on the part of the city that the contents of many sewers were already finding their way into the river and lake. Inasmuch as these works antedated the passage of the law the Board was without responsibility or power so far as these were concerned.

Urged by the need of sewerage in the district above referred to, the Cleveland authorities renewed their application the following year. A meeting of the Board was held in Cleveland March 27th, 1895, to consider that and other applications. Again the Board, by a decided majority, refused to permit the new sewer outlet into the lake unless the city water supply was filtered.

Immediately following upon this action of the Board, a joint meeting of the latter with the Cleveland Chamber of Commerce was arranged for on the evening of the day last named. At this meeting the motives governing the Board were fully set forth. The commercial body, instead of criticising said action in an unfriendly way, conceded quite unanimously that the practice of using the lake for sewage disposal and drinking water at the same time ought to be abandoned. The filtering proposition had, however, been so little studied that this condition, imposed by the State Board, was not readily accepted, though it was freely conceded that something must be done, not only to permit of sewerage on the west side, but for the sanitary protection of the whole city.

As the result of this investigation, and considering all the things involved, the chamber of commerce made this proposition, viz.: That the city would engage three engineers of national reputation in sanitary matters, whose duty it would be to recommend a plan for the provision of pure water; also a plan for the safe disposal of the city's sewage. On their part the members of the State Board agreed to approve the plans that would be formulated by such an expert commission, it being understood that this action comprised also consent to the construction of the new sewer so much desired. It was hoped, in fact it was believed, that such an expert commission would necessarily recommend filtration.

The Cleveland engineering department had already, the year previous, planned an extension of the intake several miles farther out into the lake instead of filtration. The experts approved this tunnel extension, which is now nearly completed; they also recommended an intercepting sewer with outlet ten miles to the east, which is under construction. They also favored a pumping station several miles above the mouth of the Cuyahoga River, the effect of which would be to cause an inflow of lake water into the river harbor; this has not been acted upon.

The incidents above related are here recalled simply to show that in now recommending the efficient filtration of the Cleveland water supply as a safeguard against typhoid and other filth diseases, this Board is consistent with itself. The result of the compromise was naturally disappointing. But the city sewer needs were pressed, and the Board gave its approval, as it had agreed to do, but the same was given with decided reluctance. The Board is not infallible. It has much to learn, particularly in the direction of "*Fiat justitia, ruat coelum.*"

WILL THE NEW CRIB FURNISH PURE WATER?

We have seen a printed statement that a city officer advises against filtration until the sanitary effect of the new intake has been manifested. To this it may be replied that efficient filtration, filtration which eliminates from 96 to 99 per cent of the bacteria, is known to be a safe protection.

The measure of protection to be afforded by the more distant inlet is not known; it is gruesome to go on experimenting in matters that concern health and life.

A sad result from this kind of unwarranted experimentation has been shown in Chicago. In the report on "The Typhoid Fever Situation in Chicago," October, 1902, by Arthur R. Reynolds, M. D., commissioner of health, is printed the following:

"During the three months ended yesterday—that is, from July 1st to September 30th, 1902, inclusive—402 deaths were reported from typhoid fever to the bureau of vital statistics of the health department. During the corresponding three months of last year, 212 such deaths were reported. These figures show an increase of nearly 90 (89.6) per cent this year over last for the corresponding period."

Dr. Reynolds mentions certain impure milk supplies and other minor causes for the increase of the fever, and then prefaces his conclusions by saying: "But after due weight is given to other causes the fact still remains that a polluted water supply is the chief factor in the causation of typhoid."

Now Chicago's principal water intakes are four miles from shore. Instead of loading her water-body with all of her unwholesome contributions, her port-river, with a reverse current due to her thirty million drainage canal, substracts and removes the most contaminated part of her shore water. How different Dr. Reynolds' report might have been—would certainly have been—had that thirty millions, or half, or quarter of that sum, been spent in wisely constructed filters!

According to Dr. Reynold's report the drainage canal has had little or no effect in lowering the water level of Lake Michigan. The case might be different if the drainage stream was one hundred times larger than now, and was thus made capable of effecting a real change in the character of the great water-body at the city's front (from whence the city's supply is derived) as well as in the river channel. Even then, and even after interceptors have conducted the sewage into the drainage stream, is it pointed out by Dr. Reynolds that there remains abundant, and ever increasing sources of contamination both north and south of the city. It is safe to predict that, notwithstanding her drainage canal, and notwithstanding her admirably conducted health department, Chicago will have to filter her water before she can take sanitary rank with the great European cities of her class, all of which have filtered water supplies.

DANGER FROM NEGLECTED DISINFECTION.

After careful local scrutiny the expert correspondent of the Journal of the American Medical Association favors the view that the late serious epidemic of typhoid fever at Ithaca, N. Y., was due to a case that existed

somewhere on the watershed of one of the surface streams furnishing the city water supply. There were 1,055 cases and 68 deaths at Ithaca inside of ten weeks.

This parallels the one case that preceded the outbreak at Plymouth, Penna., in 1885. This epidemic resulted in 1,100 cases of the fever and 110 deaths inside of four weeks. A thaw had washed the carelessly exposed feces into the town's water supply two weeks previously—the incubation period of typhoid is generally from 8 to 14 days. The period of maximum development of cases at Ithaca, February 4 to 6, 1903, had also been preceded by a thaw. Many instances of frightful epidemics resultant from a single case, sometimes almost dramatic in character, are to be found in the published records.

INADEQUACY OF TEMPORARY EXPEDIENTS.

When once an epidemic has declared itself as the result of a wholesale pollution of a public water supply, it must be combatted by boiling and by substituting a better temporary supply, and the danger of secondary cases should, as much as possible, be headed off by disinfection of feces and other sanitary measures.

Professor Koch, the noted bacteriologist, declares that typhoid fever can be stamped out through proper treatment of each case. He urges that every case of typhoid fever be as strictly isolated as a case of cholera, and by such isolation the disease could be wholly exterminated. While no one may care to take issue with this proposition, its realization seems rather remote. Even Germany requires the filtration of all public water supplies. American cities wishing to assure their people against epidemics of water-borne diseases must do likewise.

Where there have been so many sufferers from the disease, the loss of time, money and health due to these, and to the other evil consequences, the lowered vitality and to milder doses of poison and consequent physical derangement, is simply incalculable. Very little thought should convince any one that such water should be used only for street and manufacturing purposes, and ought not to be allowed exit through plumbing fixtures that furnish the domestic supply in the habitations of the people. The health officials and physicians do, indeed, all in their power to induce people to boil, or filter. It is all they can do. The almost total inadequacy of such advisory expedients to correct the evil is instantly recognizable. True, many do boil, others by purchase provide themselves potable water, but in the vast, mixed population of a great city the proportion of those who do so is small.

SIGNIFICANT CONTRASTS.

From the U. S. census it is learned that the annual average death rate for a decennial period from typhoid fever per 100,000 living, has been as

follows in six American cities: Allegheny, 182; Pittsburg, 127; Washington, 87; Chicago, 72; the rate in Cleveland has already been referred to. Some American cities have lower rates than those above quoted, some are higher—Birmingham, Alabama, is given at 264.

In six European cities the rate during the same period as that for six American cities above named was: London, 17; Rotterdam, 12; Dresden, 5; Hague, 2; Berlin, 9; Hamburg, 18.

Why this discrepancy in foreign cities? Filtration. Prior to filtration the ravages of typhoid were quite as severe in the latter as they are now in American cities. Professor A. M. Seibert, of the New York Polyclinic Medical School, in referring to fatalities resulting from typhoid fever says that in Hamburg and Berlin a decade before filter plants were introduced, one in every 2,600 inhabitants died, but that the death rate sank to one in 11,000 for the six years after filtered water came into use.

We have been accustomed to obtaining water without other expense than pumping, but better methods are fast coming into vogue, here as well as in Europe, where, at the present time, cities surpassing an aggregate population all the cities of the United States are supplied with filtered water. In fact, in the more advanced foreign countries no lake, river or surface water of any kind, polluted or unpolluted, is tolerated as a public supply until it has passed through the filters.

It may be said parenthetically that the addition of filtration by no means implies that the investment in the Cleveland tunnel extension would be a total loss. The current expense of maintaining every form of good filtration is graduated by the amount of impurities to be removed. The work imposed by a four mile inlet would presumably be much less than that necessitated by one only two miles from shore.

FEASIBILITY OF FILTRATION.

Is a filter plant feasible for a water consumption of such magnitude as that required in Cleveland? An affirmative answer is amply justified. While refraining from comments on engineering features it may be remarked, in a general way, that surface waters are filtered through sand beds, slowly; or more rapidly by the aid of mechanical devices.

In urging upon the State Board of Health the wisdom of recommending filtration of the Cleveland city water as the surest known remedy against the recurrence of typhoid fever and other intestinal ills, your committee is no longer dependent upon European examples to illustrate the feasibility of that method. American examples are multiplying rapidly, in fact there is no feature of municipal sanitation today which has in it equal promise of beneficent results. Among the larger cities that are already enjoying the protection of sand filters are Albany, N. Y., Lawrence,

Mass., Poughkeepsie, N. Y., Mt. Vernon, N. Y., Little Falls, N. Y., Milford, Mass., Ashland, Wisconsin, Superior, Wisconsin, Hudson, N. Y., Denver, Colorado.

The list of cities using mechanical filters is still larger, comprising the large East Jersey Company, supplying Paterson, Passaic, and other cities in New Jersey; Atlanta, Ga., St. Joseph, Missouri, Oakland, California, Kansas City, Kansas, Norfolk, Virginia, Augusta, Georgia, Quincy, Illinois, Dubuque, Iowa, Terre Haute, Indiana, Binghamton, N. Y., Elmira, N. Y., Chattanooga, Tennessee, Davenport, Iowa, Little Rock, Arkansas, Oshkosh, Wisconsin, Macon, Georgia, Burlington, Iowa, Knoxville, Tennessee, Lexington, Kentucky, Kingston, Ontario, York, Pennsylvania, Biddeford, Maine.

A HOPEFUL OUTLOOK FOR PURE WATER.

As already stated, in the more advanced countries of Europe, practically all corporations furnishing surface water must filter it. Underground waters are usually permitted, the same having already been naturally purified. There, arbitrary power fixes the conditions. Here, where popular preponderance, an always changing factor, has temporary control, the average "Sovereign" element must be invited to a careful study of the subject before the best results can be hoped for. By the lists of cities presented above, which do not comprise many of the smaller filtering towns, it will be seen that Americans are fast learning to give good heed to the most important sanitary lessons of our time. It is quite safe to say that hereafter no new public surface supply will be permitted in Ohio that does not furnish filtered water.

The Paterson works above referred to were put in operation September, 1902. Their capacity is 32,000,000 gallons daily and the cost has been fixed at \$2.50 per million gallons.

In neither of the above lists is included a much larger number of smaller places where filters have been installed. Among the latter are Lorain, west of Cleveland, and Conneaut, east of that city. Nor need one go farther away than these two places to establish the efficacy of filtration in abatement of zymotic diseases during the efficient operation of the plants named. The occasional occurrence of typhoid in a filtered town has thus far been found to point unerringly to neglect or parsimony in the care of the plant, and relief has followed immediately upon rectification of the mistakes and the prudent care of the filters.

It is also significant that, after, long and careful experiment, it was decided to filter the grossly polluted water supply of Pittsburgh. The plans were already fully prepared and decided upon when disagreements among those in political control side-tracked the enterprise. Now at length, under the spur of a growing typhoid death rate, and of popular

clamor, there is some hope that the good work will be taken in hand. A Pittsburgh dispatch of June 13th says: "The great death rate from typhoid fever, due to the bad water consumed by the people of Pittsburgh, has alarmed the mayor. He has called the filtration committee of the councils to meet next week, when plans long under consideration will be discussed for positive action. It is proposed to erect a filtration plant at a cost of \$500,000."

The plans of the large new works projected for Cincinnati and Louisville comprise filtration. Washington, D. C., has let contracts for filtered water, to be completed by December 31st, 1904, and Philadelphia has construction already well under way. The latter works are to cost \$20,000,000.

In arranging for the new water supply for Toledo the engineer furnished an estimate for water obtained from Lake Erie, thirteen miles distant; also for water taken from the river at a point near the city. Both supplies our Board required to be filtered.

In the last number of *The Sanitarian* a correspondent writes: "The people of Wilmington, Delaware, are to be congratulated that they are to have a pure water supply. An engineer has been engaged. A maximum of 40 bacteria per cubic centimeter is guaranteed. Since the present raw water contains an average of 4,000 bacteria this means an efficiency of about 99 per cent. We may hope to have thirty funerals less a year, to say nothing of the prevention of five times as many cases which result in recovery. A pure water supply will make homes. Also, many kinds of manufactories require clear water, and would prefer not to be forced to filter it themselves. Thus a pure water may stimulate industry to a considerable degree. All in all the benefits will be considerable and far reaching, and we feel confident that in time every citizen of Wilmington who may now either oppose or show indifference to the scheme of water filtration, will be included among its most enthusiastic advocates."

HOW TO ANSWER DR. ASHMUN.

Ten years ago Hamburg had a water supply essentially like that of Cleveland, and the penalty exacted was the loss of eight thousand lives in one month. With filtration that city has acquired an enviable reputation for its healthfulness. This very dear lesson was not wasted, but bore excellent fruit by forcing the more general adoption of measures for efficient sanitary protection. The question propounded by Dr. Ashmun in 1886: "How shall Cleveland obtain and maintain a pure water supply from a source so abundant and so near, and still use Lake Erie as a receptacle for all the excreta and waste substances from a large city?" Cleveland must answer as Hamburg did, and in the same way.

It also pertinent here to ask: If Cleveland's method of sewage disposal was capable of bringing about such foul conditions as are depicted in Dr. Ashmun's report in 1886, when the city's population numbered 160,000, what measures shall be put on the city's befouling capabilities now that the urban population has been more than doubled? These are things that involve the health and lives of individuals. Surely no ill-considered form, nor any other form, of experimentation should becloud attention when the experience of millions of people shines out clearly upon the only safe path to be pursued. The rule, "Allow no unfiltered surface water in the reservoirs, or city system," has been learned at enormous cost of money and suffering, and the existing sad conditions in Cleveland should prompt as speedy compliance with the same as possible.

CLEVELAND VIEWS ON CONTAMINATION.

We must not be understood as aspiring to, or trenching upon the functions peculiar to the sanitary engineer. We hope to throw light on the matter, and that is all. Also, in presenting to the Board the results of its investigations, the committee cannot lay claim to any knowledge as to the causes of the epidemic that have not already been made through the newspapers of Cleveland. During a winter epidemic it was printed that the water was at fault "because the sewage was confined under the ice, thus excluding the purifying action of both sun and air." At another time the sickness was charged to the fact that the sewage was not "confined," but had settled upon the harbor bed, and was flushed out to the intake by the spring freshets. At still another time (this time by Dr. Friedrich), it was declared that "the recent increase in the typhoid fever epidemic is due to the continued south wind which blows the sewage from the mouth of the river out to the intake crib."

These statements in regard to locally and publically acknowledged sources of contamination, varying as they are in character, are by no means contradictory. On the contrary they are entirely corroborative in fixing the cause of the sickness upon a polluted water supply.

AN OBJECT LESSON.

The question may be asked: How can the sewage, so small a bulk in comparison with the lake, be able to hurtfully contaminate the water supply? If the reader will take a glass pitcher containing a gallon of water and add to it just one drop of a solution of permanganate of potassa, he will have the illustration right before his eyes. In an instant the color of the chemical will permeate every part. Every school boy knows of the principle of the diffusion in liquids. In the Cleveland case there is not only the added city wastes to fear, but also the tendency of certain

micro-organisms to infinite proliferation must be taken into account. While you are about it fill another glass pitcher with distilled water (having first given it several rinsings with the same), add a drop of the potassa solution to the latter and contrast the color with that produced on the hydrant water, and you will have another and very significant object lesson.

GROWTH OF CITIES AND PURE WATER.

This Board is a state institution and naturally should concern itself with the well-being of Cleveland in the degree warranted by the fact that she is the largest city in Ohio. We fear that commercial and industrial influences have pushed and are still urging her onward in her great career and so absorbing her attention that the good old mottoes, "Public Health is Public Wealth," and "The Public Safety is the Supreme Law," are lost sight of. If once the dominant control in Cleveland could be aroused to the advantage of putting forth a supreme effort for the well-being of all her people by adding pure water to her superior advantages of location and a most enterprising population, who can doubt the grand and honorable future that will smile upon her? May we not hope to see the day when Cleveland, like London, may be able to suppress all external quarantine, throw wide open her gates and defy pestilence to effect a landing within her pure watered and well ordered limits.

Of late years not only London, but Berlin and Vienna have grown in population like the cities of our West, but not by reason of the same causes. Among the reasons quoted by themselves for this growth, filtered water stands first. Paris has lagged in the race, remaining nearly stationary. Both in respect to water and sewage disposal her methods are behind the age. In any of the large cities a typhoid epidemic showing cases in proportion to population equaling in number those in Cleveland would be heralded as a disgraceful sensation on both sides of the water.

Every one knows that the perpetuity of Rome is due to her magnificent supply of pure water. Every other feature was against her—people, surroundings, climate, but the aqueducts built by the ancient rulers have made Rome "Eternal," by bringing to her from the mountains 200,000,000 gallons of pure water daily; London has no more and Paris has only 90,000,000.

MORE COMPARISON.

It has seemed necessary to cite the examples of a number of home and foreign cities. The situation is one that can be made clear only by comparison. We might mention Detroit and Buffalo, cities whose supplies, being taken from rapidly flowing rivers, can suffer comparatively little harm from local diffusion. St. Louis has a suit in the federal courts

to enjoin Chicago, 200 miles distant, from polluting water that ultimately reaches the former city. Experts testified that Chicago sewage reached St. Louis in ten and one-half days. New York and Boston have surface supplies, but have spent and are still spending fabulous sums in the abatement of all contaminating influences. The situation at Chicago most nearly parallels that of Cleveland, and the lesson of that city enjoins filtration for Cleveland with almost mandatory authority. "Public Health Reports" for May 20th, gives typhoid deaths for the previous month as follows: Berlin, 3; Buffalo, 13; Cleveland, 66.

Notwithstanding the reference above made to Buffalo it should be said that a filtration plant is being seriously considered for that city. In a Buffalo paper of May 25th, 1903, we read a report, signed by the health commissioner, the bacteriologist and the chemist, strongly urging it. This report is thus summarized:

"Lake water, from which we draw our supply, is contaminated to a greater or less degree at all times.

"An intake from five to ten miles out would give pure water only for a limited period of the year.

"A filtration plant is the only assurance of a pure water supply.

"A commission should be appointed by the mayor to work out a plan for the much needed improvement."

These four paragraphs put the situation, both negative and positive, for surface water cities into the fewest words. Every experiment, sedimentation, boiling, etc., has been tried and found wanting. Go no further in that direction. Be deaf to current sensation about inventions that claim to immunize or sterilize water without removing the impurities contained in it. No intake within your reach can be permanently sheltered from the influences you have so often cited; from ice in winter, from the scouring freshets of spring, from sewage and the varying winds at all times. Allow no polluted water in your city conduits—in the stomach of the people. Be clean. Filter the public water supply.

[Signed]

June 16th, 1903.

W. T. MILLER,
W. C. CHAPMAN,
JOSIAH HARTZELL,
Committee.

REPORT ON SANITARY CONDITION OF MARYSVILLE WITH REFERENCE TO THE WATER SUPPLY AND SEWERAGE.

The board of health of Marysville desiring to improve the sanitary condition of the village made application, through their president, to the State Board of Health for advice relative to improving the quality of the

public water supply, and also the drainage so as to prevent the further use of Town Run as a sewer. Mr. Pratt, the engineer, visited Marysville, July 20th, 1903, and submitted the following report:

"The water supply for the village is furnished by the Marysville Light and Water Company, and is delivered from an eight-inch driven well, located just north of Mill Creek near Main Street. It is 145 feet deep through 90 feet of sand and gravel and 55 feet of limestone, the water coming from a vein, three feet deep, in the limestone. The water stands within 8 feet of the surface of the ground. Two pumps having a combined capacity of 1,500,000 gallons per day pump directly from the wells into the distributing system.

"A driven well on the opposite side of the creek from the waterworks well, and between it and the thickly settled portion of the village, fluctuates in accordance with the amount of water pumped from the waterworks well, showing that the ground water for the public supply probably comes from the direction of the village. Analysis of the water indicates this also.

"Nearly all the population is supplied with water from the public supply, but many prefer to use well and cistern water for drinking.

"Accompanied by the local board of health, several hydrants were visited and opened, most of which had not been opened for a long time, although the water company agrees to flush them monthly. The water from these hydrants was very offensive in appearance and odor, being heavily laden with iron sediment and smelling strongly of sulphuretted hydrogen. The hydrants in each case were allowed to flow for fifteen or twenty minutes; but the water was very little if any improved at the end of that time, showing that there must be a large quantity of sediment in the mains. On visiting a residence on the line of one of the hydrants inspected but some distance from it, the water in the tap was found to be as much discolored as the hydrant water, and not fit for use. A member of the local board said that every time a hydrant is opened the houses on the same line can not use the water for a day or so.

"These conditions are not caused by an excessive quantity of iron in the water as it comes from the ground, but are accounted for by the fact that no opportunity is allowed the moderate quantity of iron in the original water to oxidize and be removed before entering the system; consequently oxidation takes place in the mains and forms an accumulation of sediment which, in connection with the sulphur, which likewise has had no chance to escape through aeration, is the source of complaint on the part of the consumers.

"There is, at the waterworks, a direct connection with Mill Creek through which water is furnished to the T. & O. C. R. R. for boiler purposes, and may be delivered directly into the village system. It is said that no creek water is pumped to the village, and there appeared to be no

reason for so doing if the available quantity of ground water is ample, as stated."

Samples of water were collected and shipped to the laboratory for examination. Mr. Horton, the chemist, reported upon these as follows:

REPORT ON EXAMINATION OF WATER FROM MARYSVILLE.

PARTS PER MILLION.

Source of sample.....	Town Run	Spring	Well at the pump station	"Cistern" creek water
Number of sample.....	2928	2929	2930	2931
Color.....	23.	14.	14.	28.
Turbidity.....	24.	28.	64.	24.
Sediment.....	slight	trace	trace	trace
Odor.....	sewage	faint	faint	cistern
Oxygen required.....	5.71	1.76	1.76	6.10
Nitrogen as ammonia albuminoid...	.338	1.080	.078	.236
Nitrogen as ammonia free.....	1.020	.470	.420	.050
Nitrogen as nitrites.....	.009	none	none	none
Nitrogen as nitrates.....	none	none	none	none
Chlorine.....	32.6	89.6	15.8	2.1
Alkalinity.....	326.	200.	301.	193.
Incrusting constituents.....	470.	626.	564.	125.
Total solids.....	1449.	1654.	1441.	558.
Loss on ignition.....	343.	386.	342.	148.
Iron.....	1.5	1.4	2.7	.6
Bacteria per cc.....	.....	12.	12.	800.
Colon bacilli in 50cc.....	.....	no	no	yes
Source of sample.....	Hydrant at Ash & 7th St.	Hydrant, dead end, Big Four	Hydrant at 5th & Main	Tap in residence 6th St.
Number of sample.....	2932	2933	2934	2935
Color.....	15.	15.	28.	20.
Turbidity.....	113.	380.	35.	95.
Sediment.....	con'able	consid'able	slight	slight
Odor.....	sulphur	sulphur	sulphur and musty	faint
Oxygen required.....	6.88	8.49	6.05	1.61
Nitrogen as ammonia albuminoid...	.082	.206	.316	.044
Nitrogen as ammonia free.....	.406	.394	(?) .954	.428
Nitrogen as nitrites.....	.002	.002	none	none
Nitrogen as nitrates.....	none	none	none	none
Chlorine.....	13.8	15.0	19.4	16.4
Alkalinity.....	293.	283.	301.	270.
Incrusting constituents.....	567.	484.	523.	505.
Total solids.....	1476.	1578.	1419.	1446.
Loss on ignition.....	321.	372.	335.	349.
Iron.....	16.0	18.0	1.1	2.5
Bacteria per cc.....	.....	.....	36.	.....
Colon bacilli present in 50 cc.....	.....	.....	no	.....

"Sample No. 2,928, Town Run just before it empties into Mill Creek, is a surface water badly polluted with sewage any may cause a nuisance.

"Sample No. 2,929, the so-called 'spring' across the creek from the waterworks wells, and also 2,930, the waterworks well at the pumping station, considered from the organic side are very similar and are usable waters for drinking purposes. The objections to them are from the mineral side as they are high in inorganic matter and so much so as to be undesirable. Both waters are excessively hard and not usable for boilers, the spring being a little worse. The spring water is much higher in chlorides, due perhaps to some leakage of salt water, although such a leakage cannot be very great. Both waters contain some iron and would cause some complaint on that account. The free ammonias here are to be looked upon as coming from reduction, and do not represent direct sewage pollution, although the analyses would indicate that both waters have been in contact with some past pollution, but are now purified.

"Sample No. 2,930 is an extremely undesirable water for a public supply on account of its mineral characters, but this is not to be interpreted that this water, if used, would be dangerous to health, in the sense of producing the specific water-borne diseases. They are sulphur waters.

"Sample No. 2,931, 'cistern' at pumping station, is creek water. The analysis indicates a much softer water than the others, and yet this is rather hard. It contains less iron and much less chlorine as chlorides. There is some vegetative organic pollution of this water, but at the time of sampling it was receiving or had received but very slight sewage pollution. Intestinal bacteria were found in 50 cc. but not in 1 cc. of the water. This is not a desirable water to be added to a public supply, and whether it should be admitted in emergency cases is a question depending somewhat on the opportunities there may be for sewage pollution at other times.

"Samples Nos. 2,932 and 2,933 are from hydrants little used; No. 2,934 from a hydrant used frequently; and No. 2,935 from a residence where the water was in ordinary use. A comparison of these four samples with the one from the waterworks well shows that the character of the water varies to some extent. (See chlorides, alkalinities, incrusting constituents, and total solids.) The sample from the residence (No. 2,935) agrees very well with the one from the well, but the others show some departures. The increase in nitrogen as albuminoid ammonia in samples 2,933 and 2,934, together with the increase in oxygen required might be caused by the addition of creek water, or of other surface water at some point in the system, but it is said the emergency intake by which creek water might be admitted is not used.

"The results indicate how much the water deteriorates by standing in the pipes and how very undesirable it then becomes for domestic use. The odor is very bad, and the water contains a large amount of iron, ob-

tained in part from the pipes, and the water is therefore disgusting to the senses of smell and taste and sight.

"Unless this water first receives treatment, the results show how advisable it is to have the water fresh and not confined in the pipes of the system for any period of time. Even at best this water is not to be considered a desirable water for a public supply."

"The State Board of Health has already advised the village regarding sewerage as follows:

"October 11, 1894, upon Dr. Probst's report that, 'Your (local board of health) board should, therefore, urge upon council and upon your citizens the necessity of sewers. You should also condemn the run (Town Run mentioned below) as a nuisance; and if sewerage is not provided, should take steps to lessen the nuisance, as much as possible in some other manner.'

"One year later, October 9, 1895, the Board approved plans for sewerage which provided for discharge of sewage into Mill Creek, stipulating, however, that the channel of the run should be deepened and weeds cleared away near the outlet. It also strongly recommended the purchase of lands for disposal purposes.

"The village has increased from less than 3,000 in 1895 to over 4,000 at present, but no action has ever been taken in regard to building any sewerage system, although the need of it has become greater year by year.

"Town Run, which is a ditch built to drain the meadows west of the village, flows through the thickly settled portion of the village and discharges into Mill Creek after receiving the sewage, through private drains, of about fifty houses. Several stables also drain into it and deposit manure on its banks to be washed in by heavy rains. At the time of my visit there was very little flow in the run, and its condition was very foul and offensive. Conversation with several occupants of houses and shops along its course called forth expressions of indignation and disgust at such conditions being allowed to continue.

"In times of flood this run becomes a further nuisance by overflowing its banks and flooding many cellars.

"It is very important that Marysville should construct sewers, not only to abolish the nuisance which the run is now causing, but also for the sake of the general sanitary condition of the village and to protect the public water supply which, as mentioned above, is probably drawn from under the village.

"Mill Creek cannot be depended upon to furnish sufficient water to properly dispose of the sewage of Marysville, as the estimated average dry weather flow (based upon the run-off data for the entire Scioto watershed) would not be more than two or three second feet, and the creek occasionally becomes entirely dry. It will be necessary, therefore, to adopt some method of purification.

"In order to improve the water supply and sanitary condition of Marysville, the village, through its local board of health, should be advised to build, under the direction of a competent engineer, the following:

"1. A reservoir in which the removal of a large portion of the iron and sulphur now contained in the water, may be brought about before it enters the distributing system by aeration and sedimentation of the oxidized iron. This should be so arranged that it can be used in connection with any future filtration or water softening plant that may be built.

"2. A system of sanitary sewers.

"3. A sewage disposal works.

"4. A conduit in the bed of Town Run which will take the flow of same and prevent entrance of any sewage.

"The village should also be advised to see to it that all hydrants are flushed regularly and frequently, and that no creek water be in any case allowed to enter the water mains."

This report was submitted to the State Board of Health and upon being approved by it, a copy was sent to the president of the board of health of Marysville with the statement that the Board would be glad to render any assistance possible in bringing about necessary changes and improvements in the sanitary condition of the village.

REPORT OF AN INVESTIGATION OF THE SANITARY CONDITIONS AT PUT-IN-BAY.

Complaint was made to the State Board of Health of the unsanitary conditions at Put-in-Bay, and the Board was asked to make an investigation. Mr. R. W. Pratt, the engineer, visited Put-in-Bay on September 5th and submitted the following report:

"Put-in-Bay is an incorporated village of 300 inhabitants situated on South Bass Island in Lake Erie about twenty miles north of Sandusky. The corporation itself is small in area covering probably not more than 150 acres, and the remainder of the island comprising a township of the same name.

"This place is one of the most popular of the Ohio lake resorts especially for day-excursionists. During the summer season there are from 3,000 to 6,000 visitors each day in addition to the 500 or more hotel guests and summer residents within the corporation limits. Hotel Victory, a large establishment on the opposite side of the island from the corporation, is not to be considered in this report.

"In 1896 the Board on complaint of interested parties investigated a nuisance caused by the discharge of sewage from the Beebe House

into the lake at a point about 180 feet from the water supply. The local board of health was advised to remedy these conditions.

"The present petition, signed by several property holders, is made principally on account of the same Beebe House sewer which the Board reported on seven years ago; but also asks that the Board do all in its power to improve the general sanitary condition of the corporation.

"Since last inspected by the Board the Beebe House sewer has ceased to discharge into the lake either because its outlet became clogged through lack of care, or because it was closed intentionally to prevent sewage reaching the lake. At any rate at present there is no outlet for the sewage and consequently it overflows periodically at two places; the first being at a cesspool on the sewer line at the north side of the Beebe House land a few feet from the sidewalk, and the second on land of J. C. Morris across the street from the Beebe House. At this second place there is a hole in the ground several feet across, in which the sewage rises as the sewer fills up. This hole is covered by some loose boards and surrounded by a rough fence in order to keep people from falling in. When the sewage overflows, the hotel proprietors have enough of it taken away to make room for more and so on during the summer. Evidences of recent overflows were seen some distance from either of the openings showing that the sewage must have spread out over a considerable area and almost in the path of hundreds of excursionists and hotel guests. In spite of all this it would not be advisable to open the clogged outlet and allow sewage to flow into the lake on account of proximity of outlet to intake pipe that supplies the Beebe House and other places with water.

"In general both the private cottages and hotels use water from wells dug or driven into the limestone rock which underlies the island. The Beebe, Park and Ward hotels and some few cottages are supplied with lake water by means of windmills.

"A privy upon the wharf discharges about 100 feet from the intake for these hotels. It may be said that practically all of the sewage and wastes from both hotels and cottages are discharged into cesspools or privy vaults of some kind which usually consist of holes, known as 'caves' in the limestone. The latter are considered convenient because all of the liquid wastes disappear so readily through the crevices in the rock. The danger of these wastes reaching the wells sunk in this same rock is not thought of.

"A rough cesspool in the rear of the Museum receives the sewage overflow from another cesspool at the Park Hotel, and all sink drainage from the Park and Ward hotels and from the Museum. It is estimated that 2,000 gallons of foul water are daily discharged into the hole in the limestone which however rarely fills as the water runs off through crevices in the rock. The water closet wastes from the Ward Hotel are

discharged into a cesspool situated in a chicken yard under the rear window of the building. The cesspool which is covered by rough boards fills, as stated by the proprietor, every week and if the wind is blowing away from the hotel (so that the guests will not leave) the putrefying contents are pumped or shoveled out into trenches and buried. The conditions at the rear of the hotel were disgraceful; chickens running around in the sewage and grease and flies were making frequent trips to the hotel kitchen. The stench was sickening. Several cases of typhoid have occurred among occupants of the hotel recently. The proprietor states that he is willing and anxious to improve matters, but that there is no sewer and that the corporation will not allow him to build one of his own to the lake. The water supply of the Park Hotel was formerly derived from a driven well nearby and it was proposed to advertise and sell it for its medicinal properties; but the chemist who analyzed it did not recommend placing it upon the market. The well is not now in use, the Park and Ward hotels being supplied from the lake.

"Sink drainage and overflow from sewage cesspools at Oelschlager's Hotel and the Put-in-Bay House are discharged into a large, shallow, 'cave' in the limestone about half way between the two houses and several hundred feet from each. This 'cave' is 50 feet long, 15 feet wide and 6 or 7 feet deep with 1 or 2 feet of water in the bottom, the level of which is said to vary with that of the lake; at any rate all the liquid wastes discharged there do not seem to affect the level. The place is also used as a general dump. Not 50 feet away is a summer cottage which for obvious reasons the owner cannot rent.

"The water supply of Oelschlager's Hotel and it is understood of the Put-in-Bay House also is taken from wells on the premises. During the evening of my visit, although the weather was cool, the odor from the Museum and Ward Hotel cesspools could be distinctly smelt at least 800 feet away, while 200 feet away the odor was very disagreeable.

"In this small corporate area with water supply and sanitary accommodations hardly suitable for the native population of 300 there are crowded daily from 3,000 to 6,000 people, and yet not even a public water closet, except inadequate ones in the hotels, is provided.

"The sanitary condition of Put-in-Bay in regard to water supply and sewerage is a disgrace to those responsible. It is true that the actual number of taxpayers in the corporation is small and that a sewer assessment would be large; but on the other hand there is a considerable number, including the summer residents, who are willing and anxious to pay almost any sum in order to procure improved sanitary conditions, while those who are opposed to expending money for such a purpose, it is understood, are nearly without exception the ones who make their living from the summer visitors, but who are not willing to go to any expense to protect these visitors from the discomfort of obnoxious odors and the

danger of disease. From reconnaissance of the ground it seems practicable to build a system of sewers to drain nearly all of the corporation and discharge at a point of land on the southeast side of the island about one-third of a mile south of the bathing beach; the outlet to be carried out into deep water. The few buildings along the north side of the corporation which are too low to connect with the system can discharge without nuisance into the harbor if the outlet is carried several hundred feet out.

"The use of all wells should be abandoned and waterworks constructed with intake in deep water near the northerly limits of the harbor.

"It is recommended that the Board advise the corporation to take immediate steps toward constructing water and sewerage works along lines suggested above and in case of failure to comply with this advice to inform the public as to the danger to health in visiting the place."

A copy of this report was sent to the board of health and also to the council of Put-in-Bay on September 15th, 1903, and the council was notified that they would be expected to take some measures to place this resort in a proper sanitary condition as regards both water supply and sewerage and, if this was not done, the Board would feel called upon to inform the public of the sanitary conditions existing at this place.

EXAMINATIONS MADE IN THE
LABORATORY.

WORK OF THE LABORATORY.

This part of the report deals with the various examinations made in the laboratory during the year ended December 31st, 1903. The work has been done by Mr. Elmer G. Horton, chemist and bacteriologist in charge of the laboratory, assisted by Mr. Homer D. Williamson and Miss Caroline Richardson.

The number of examinations during the year was 2,500 as compared with 1,319 for last year, showing a notable growth in the demands for laboratory examinations.

In addition to routine work the laboratory participated in the following special examinations:

- a.* Diphtheria conditions at the O. S. & S. O. Home, Xenia.
- b.* Sanitary condition of the Ohio Penitentiary.
- c.* Disinfection tests with commercial apparatus and products.
- d.* Efficiency of filters in the State House.
- e.* Character of sewages and effluents at sewage disposal plants in Ohio.
- f.* Special study of certain public water supplies.
- g.* An examination of public water supplies in Ohio not previously examined.

The expenses during the year were:

Salaries	\$3,042 50
Apparatus, supplies, incidentals	386 90
Traveling expenses	83 48
<hr/>	
Total	\$3,512 88

DIPHtheria EXAMINATIONS.

Number of Sample.	Place.	Month.	Day.	Age.	Sex.	Color.	Temperature.	Physician's Diagnosis.	Membrane Present.	Day of Disease.	Result.	Remarks.
178	Beverly.....	Feb.	9								+	
322	Bridgeport....	Sept.	7	4	f	w	102	Diphtheria.....	Yes	1	+	
328	Chicago.....	Oct.	1*					Suspected diphtheria	No		+	
330	Chicago.....	Oct.	22	3	m	w	103	Diphtheria.....	Yes	2	+	
331	Chicago.....	Oct.	27*	3	m	w			No		+	
332	Chicago.....	Oct.	27	14	m	w	not taken	Tonsillitis.....	Yes	6	+	
333	Chicago.....	Oct.	30	32	f	w	103.4	Suspected diph.....	Yes	5	unsatis	
339	Chicago.....	Dec.	25	1 $\frac{1}{3}$	f	w	103	Diphtheria.....	Yes	2	+	
175	Dublin.....	Jan.	16	5	f	w	110	Diphtheria.....	Yes	14	+	Treated before for tonsillitis.
329	Galion.....	Oct.	15	8	m	w	100	Not positive.....	Yes	2	+	
188	Junction City..	Apr.	11					Diphtheria.....			+	
173	Montpelier....	Jan.	1*	9	m	w	102.5	Diphtheria.....	Yes	2	+	
174	Montpelier....	Jan.	1*	9	f	w	103	Diphtheria.....	Yes	3	+	
176	Montpelier....	Jan.	19*					Diphtheria.....			+	

DIPHTHERIA EXAMINATIONS—Continued.

Number of Sample.	Place.	Month.	Day.	Age.	Sex.	Color.	Temperature.	Physician's Diagnosis.	Membrane Present.	Day of Disease.	Result.	Remarks.
177	Montpelier....	Feb.	2*	22	m	w	99	Tonsillitis.....	Yes	1	—	Very little material used.
180	Montpelier....	Mar.	5	15	f	w	101.5	Reserved.....	Yes	2	—	
193	Montpelier....	Apr.	19	26	m	w		Suspected diph....	Yes	3	+	
196	Mt. Sterling....	May	11	8	f	w	100.4	Diphtheria.....	Yes	3	+	
335	New Paris....	Nov.	23	5	f	w	99	Membr. croup—diph.	Yes	6	+	
315	Piqua	June	27	8	m	w	104	Diphtheria.....	Yes	3	+	
316	Piqua	July	8	11	f	w		Diphtheria, disputed	Yes	3	+	
317	Tiffin.....	July	10	25	f			Diphtheria.....	Yes	10	—	3 samples re'd in this case
318	Tiffin.....	July	11*									
319	Tiffin.....	July	11*									
320	West Jefferson..	July	17	14	m	w	99.1	Diphtheria.....	Yes	12	+	
334	Waterford.....	Nov.	20	14	m	w	103	Diphtheria.....	Yes	2	+	
179	Xenia ^a	Feb.	26	8	f	w	99.2	Diphtheria.....	Yes	5	+	

*Date received.
 a For examination of 102 specimens in special investigation at Xenia, see special report elsewhere.

181	Xenia.....	Mar.	24	14	f	w	102.4	Foll. Tonsilitis.....	Yes	1 ?	+
182	Xenia.....	Mar.	24	7	m	w	101.2	Prob'y Foll. Tonsilitis	Yes	1 ?	—
184	Xenia.....	Mar.	26	7	m	w	102.4	Probably Tonsilitis.	Yes	1	+
185	Xenia.....	Mar.	26	14	m	w	102	Probably Tonsilitis.	Yes	1	+
186	Xenia.....	Apr.	6	37	f	w	n		Yes	2	+
187	Xenia.....	Apr.	9	16	f	w	99		Yes	2	—
189	Xenia.....	Apr.	11	9	m	w	102.8	Foll. Tonsilitis.....	Yes	1	+
190	Xenia.....	Apr.	14	13	m	w	100.8	Foll. Tonsilitis.....	Yes	1	+
191	Xenia.....	Apr.	15	13	f	w	101.6	Foll. Tonsilitis.....	Yes	2	+
192	Xenia.....	Apr.	16	14	m	w	102.8	Foll. Tonsilitis.....	Yes	1	+
194	Xenia.....	May	5	16	m	w	98.4	Foll. Tonsilitis.....	Yes	2	—
195	Xenia.....	May	8	8	m	w	104	Foll. Tonsilitis.....	Yes	2	+
299	Xenia.....	May	27	11	f	w	101.6		Yes	2	+
300	Xenia.....	May	27	16	f	w	99.6		Yes	2	+
301	Xenia.....	May	29					Diphtheria.....			+
302	Xenia.....	May	29					Diphtheria.....			+
303	Xenia.....	May	29					Pharyngitis.....			—
304	Xenia.....	May	29	8	f	w	100	Diphtheria.....	Yes		+
305	Xenia.....	May	29	8				Diphtheria.....	Yes	3	+
306	Xenia.....	May	29								—

DIPHTHERIA EXAMINATIONS—Concluded.

Number of Sample.	Place.	Month.	Day.	Age.	Sex.	Color.	Temperature.	Physician's Diagnosis.	Membrane Present.	Day of Disease.	Result.	Remarks.
307	Xenia.....	May	29								—	
308	Xenia.....	May	29								—	
309	Xenia.....	May	29								+	
310	Xenia.....	May	29								—	
311	Xenia.....	May	29								—	
312	Xenia.....	June	4	15	f	w	100.4	Diphtheria.....	Yes	2	+	
313	Xenia.....	June	12	12	m	w	101.2		Yes	1	+	
314	Xenia.....	June	12	13	f	w	n	Not Diphtheria....	Yes	3	+	
321	Xenia.....	July	27	10	m	w	103.6		Yes	2	—	
323	Xenia.....	Sept.	7		f	w	103.8		Yes		+	
324	Xenia.....	Sept.	10	8	m		102.6		Yes		+	
325	Xenia.....	Sept.	10	15	f		101		Yes		—	
326	Xenia.....	Sept.	14		m		102.4		Yes		+	
327	Xenia.....	Sept.	28	27	f	w	102.2		Yes	1	+	

337	Xenia.....	Dec.	11	10	m	102.6		Yes	+
338	Xenia.....	Dec.	17	16	m	w 101.6		Yes	+
183	Zanesville.....	Mar.	25	28	f	w 102.6	Suspected Diph....	Yes	+
336	Zanesville.....	Nov.	28	13	m	w 99.8	Tonsilitis Diph. ?...	Yes	+

Total of 65 examinations; 48 positive; 16 negative; 1 unsatisfactory.

MISCELLANEOUS EXAMINATIONS.

Laboratory Number.	Place.	Number of Samples.	Nature of Sample.	Examined for	Remarks.
145	Bellevue.....	1	Material from cistern.....	Character.....	Faecal matter.
13,126	Bettsville.....	3	Meat.....	Actinomyces .	1 pos. 2 neg.
40 Tb	Chillicothe.....	1	Sputum.....	Tubercle bac..	Positive
31,38 Tb	Columbus.....	2	Sputum.....	Tubercle bac..	Negative.
32-35 } 41 Tb }	Columbus.....	5	Sputum.....	Tubercle bac..	Positive.
	Col'bus Ohio Penitentiary..	335	.....	.....	See special rep.
	Columbus State House.....	128	Filter Effluent	Efficiency	See special rep.
21,22 Ty	Columbus.....	2	Typhoid blood	Widal reaction	2 positive.
152	Columbus.....	1	Urine.....	Siazo reaction.	Negative.
156	Columbus.....	1	Dog.....	Rabies.....	Positive.
154	Crooksville.....	2	Pork.....	Trichina.....	Negative.
135	Fostoria.....	1	Fou'd in water	Identification..	Crustaceous.
112	Lima.....	1	Milk.....	Formaldehyde	Present.
27, 28, } 43-45Tb }	Malvern.....	5	Sputum.....	Tubercle bac..	4 pos. 1 sus.
42 Tb	Malvern.....	1	Sputum.....	Tubercle bac..	Negative.
143	Perry County Reading Tp..	1	Dog.....	Rabies.....	Positive.
46 Tb	Piqua.....	1	Sputum.....	Tubercle bac..	Positive.
37 Tb	Shelby.....	1	Sputum.....	Tubercle bac..	Positive.
142	Somerset.....	1	Head of horse.	Rabies.....	Positive.
36,39 Tb	Tiro.....	2	Sputum.....	Tubercle bac..	Positive.
30 Tb	Tiro.....	1	Sputum.....	Tubercle bac..	Negative.
29 Tb	Waterford....	1	Sputum.....	Tubercle bac..	Negative.
144	Wellington....	1	Dog.....	Rabies.....	Positive.
153	Whetstone....	1	Dog.....	Rabies.....	Positive.
155	Xenia O.S.&S.O.				
	Home.....	1	From a tonsil..	Identification..	A hair.
	Xenia O.S.&S.O. Home...	113	Diph. inves'tion		See special rep.
123-130		7	Vaccines.....	Purity.....	Generally good.
151		1	Ivory soap....	Disinfectant...	Inefficient with short exposures
122, } 131-4 } 136-7 } 139-141 } 146 }	.....	17	Commercial disinfectants..	Efficiency.....	Generally inefficient—see special reports.

EXAMINATIONS OF WATERS.

a. PROPOSED PUBLIC WATER SUPPLIES.

During the year 1903, examinations have been made of 45 samples of water in connection with sources proposed as public supplies or as additions to existing supplies in 20 cities and villages as follows:

Place.	Number of Samples.	Source of Sample.
Bainbridge.....	2	Wells, dug.
Barberton.....	4	Wells, driven.
Bellaire.....	2	Ohio River, Moundsville, West Virginia, hydrant.
Brookville.....	2	Wells, drilled.
*Cadiz.....	2	Wells, drilled.
Findlay.....	2	Wells drilled.
Jacksonville.....	2	Mine; well, dug.
Johnstown.....	2	Well, drilled.
Lancaster.....	2	Well, drilled.
*Leipsic.....	2	Well, drilled.
Lima.....	2	Well, drilled.
Milford.....	1	Well, drilled.
Murray City.....	3	Well, driven.
Ottawa.....	3	Wells, 1 drilled, 2 dug.
*Salem.....	2	Wells, drilled.
*Scio.....	2	Well, drilled; Dining Fork Creek.
*Springfield.....	2	Filter gallery.
Strasburg.....	3	Well, driven.
West Manchester.....	1	Well, driven.
*Wooster.....	4	Wells, 1 drilled; 3 driven.

*Proposed as additional supplies.

The analytical results for these samples will be found in the section devoted to reports on public water supplies.

b. EXISTING PUBLIC WATER SUPPLIES.

The sources of the present public supplies of some of the cities and villages of Ohio are such as to indicate that their waters must, at times, receive more or less pollution. With some of these supplies the consumers have been uncomplaining, while in other cases, more or less complaint has reached the State Board of Health. Early in the year nine supplies were selected for special study, viz.: Alliance, Bellaire, Defiance, Fremont, Mingo Junction, Port Clinton, Sandusky, Tiffin and

Zanesville. The local health authorities were willing to assist and have very kindly collected samples at such times as requested. Examinations were made as frequently as other work in the laboratory would permit, and the results of the study are given at the commencement of the section on existing public water supplies.

Following the report of this special investigation, there are given the results of the examination of samples from various present supplies, where the local authorities had for some reason requested an analysis to be made.

The quality of the water in quite a number of the villages and smaller cities had never been determined by analysis, and accordingly samples were obtained from these supplies, although it was not thought these waters were objectionable. The results of these examinations are entered in this section, and where an emergency intake existed a sample from it was also examined, for the reason that the past in Ohio has taught that the use of water from emergency intakes has been, in some cases, detrimental to health and destructive to life.

A REPORT ON PERIODICAL EXAMINATIONS OF CERTAIN PUBLIC WATER SUPPLIES.

WATER SUPPLY OF ALLIANCE.

For a full description of the water supply of Alliance see the Thirteenth Annual Report of the Ohio State Board of Health, 1898, page 522. The various opportunities for pollution by sewage may be found in the reference cited and also on pages 164-166, Sources of Public Water Supplies, 1898. The supply is derived from Mahoning River, and the water is used without treatment other than brief subsidence in a reservoir. Briefly it may be said that the supply for Alliance is subject to pollution from the sewages of a summer resort and hotel at North Georgetown, the Fairmount Children's Home, and portions of East Alliance and even Alliance itself.

The results obtained in the eight samples secured during 1903 sustain the earlier sanitary inspections in indicating pollution of the public supply. Colon bacilli, indicative of intestinal discharges, were present in one cubic centimeter portions of water in six of the samples, and in one of the remaining samples they were found when a 50 cc. portion of water was used for the test. The number of bacteria ranged from 550 to 20,000 per cc. and only three of the eight findings were below 1,000. The chemical determinations for oxygen required and the nitrogens show more or less organic pollution each time. All of the samples showed some turbidity and suspended matter, although these were not bad and the suspended solids were always low. In most cases it was so evident that the suspended solids were very low that no attempt was made to determine the amount.

An examination of samples of raw sewage and effluent from the sewage disposal plant at the Fairmount Children's Home, May 6, 1903, showed that the plant as in operation at the time gave very little purification—merely removing the coarser material. The percentage of reduction in organic matter was only 20.1 per cent measured by the oxygen required and 43.6 per cent by the albuminoid ammonia. The effluent analysis gave the following in parts per million: Oxygen required 43.69; N as albuminoid ammonia 2.860; N as free ammonia 29.760; nitrites none; nitrates none. A new sewage disposal plant (sand filtration) was installed at this institution late in the fall of 1903 and, at the outset, it gave indication of doing satisfactory work, but no samples of the effluent have been analyzed as yet.

The growth of the village of Sebring has introduced another source of pollution that should be mentioned, but steps are being taken toward the installation of a sewage disposal plant.

The examination of the Alliance samples indicates a water that is not satisfactory in appearance for a public supply, and moreover one that has more or less organic pollution all the time with part of it derived from sewage sources. The supply is not a safe one, and it may become dangerous at any time if the present sources of pollution continue and the water is used without further treatment.

The suspended solids in samples 2,744 and 2,849 were 15 and 25. The iron in samples 2,744, 2,972 and 3,214 were 2.5, .6 and .7 parts respectively.

EXAMINATIONS OF WATERS FROM ALLIANCE.

PARTS PER MILLION.

Sample Number.	Collected.	Color.	Turbidity.	Sediment.	Odor.	Nitrogen as			
						Albuminoid Ammonia.	Free Ammonia.	Nitrites.	Nitrates.
2744	April 13, 1903	65	113	decided	faint earthy	.184	.026	none	none
2808	June 1, 1903	38	22	trace	f'nt veget'ive	.200	.048	trace	trace
2849	June 30, 1903	25	very slight	trace	2 vegetative	.212	.098	.004	.3
2972	Aug. 11, 1903	31	14	slight	vegetative	.170	.052	none	none
3082	Sept. 8, 1903	30	slight	slight	faint	.256	.076	none	none
3184	Oct. 14, 1903	60	43	slight	earthy	.240	.028	trace	trace
3214	Nov. 2, 1903	30	slight	slight	none	.122	.022	trace	none
3337	Dec. 7, 1903	8	5	very slight	none	.102	.040	.002	trace
Average		36				.186	.049	.001	trace

Sample Number.	Oxygen Required.	Chlorine.	Alkalinity.	Incrusting Constituents.	Residue on Evaporation.		Bacteria.	
					Total.	Loss on Ignition.	No. per cc.	Intestinal bacteria present in 1 cc.
2744	8.23	Tr.	55	44	192	50	8,000.	Yes
2808	6.64	1.7	125	89	339		1,600	Yes
2849	4.28	1.9	101	101	356		20,000	Yes
2972	5.33	1.9	157	84	333		750	Yes
3082	6.65	2.2	104	68	262		600	Yes
3184	6.74	5.9	60	92	282		1,600	No
3214	2.92	5.0	211	49	400	128	550	No
3337	2.27	4.4	210	95	384	61	1,350	Yes
Average	5.37	2.9	128	78	318	80	4,306	

WATER SUPPLY OF BELLAIRE.

The source of the supply is the Ohio River. The water is pumped to a reservoir, but a comparison of river and tap samples in 1901 indicated no material amount of improvement in the quality of the latter. The water of the Ohio River at this point is open to pollution from various local sources, chief of which are the sewages from Martin's Ferry, Bridgeport, Wheeling and part of Bellaire. For fuller details the reader is referred to the Thirteenth Annual Report of the Ohio State Board of Health, 1898, pages 508, 514, and Sixteenth Annual Report, 1901, pages 374, 424.

Intestinal bacteria were present in 1 cubic centimeter portions of each sample of the Bellaire water examined, showing the direct influence of sewage pollution. The number of bacteria per cubic centimeter varied from 650 (which count was low owing to the overspreading growths interfering with a full count) to 7,900, while the average was 2 850. The chemical determinations indicative of organic pollution varied considerably, but always showed some pollution. The analytical results are bad enough, but that they are not worse, with the opportunities there are for sewage pollution, has given rise to the belief that there are local factors exerting, to some degree, a beneficial effect. These may be currents, local dilution influences, or a precipitation and sedimentation influence from the manufacturing refuse gaining entrance to the river in that locality.

As is well known, the Ohio River water is soft and the present findings have varied but little from those obtained with the Bellaire samples in 1901 (Sixteenth Annual Report of Ohio State Board of Health, 1901, page 334). The present alkalinities are a shade higher than those two years ago. In appearance, a majority of the present samples approached more closely a clear condition than did those of 1901, but much the highest amount of suspended solids, viz.: 509 parts, was found in the sample taken June 29, 1903. This indicates the need of studying the upper portion of the Ohio River, in order to determine whether the water carries suspended matter of sufficient amount and for long enough periods to prevent the use of the English system of filtration for water purification. It is already evident that the upper portion of that part of the river touching the state of Ohio, carries much less suspended material than the lower portion. The studies that have been made on the water of the public supply of Bellaire indicate that apparently, for local reasons, the water does not show the gross pollution that might be expected of it in view of the sewage pollutions that occur, but that it does show pollution at all times of such a serious character as not to permit it to be called a safe supply is evident. Furthermore it is such a supply as may at any time fulfill the conditions that lead to disease in epidemic form. The use of such a supply is a menace to health and steps ought to be taken to secure for the citizens, and transient public, a safer supply.

At the request of the local board of health, examination was also made of two samples of water in February, 1903, one, 2,680, being taken from the Moundville, W. Va., waterworks, and one, 2,679, from the Ohio River at the Moundville intake. The hydrant sample is an acceptable one for a public supply, but a comparison of the inorganic properties of the waters show that the hydrant water is not derived solely from the river, but that it contains some subsoil water.

The Moundville supply is derived from a sand bed in the river and is in general principle like the supply at Gallipolis, which has given a satisfactory water for several years. The determinations for iron were as follows in parts per million: No. 2,740, 6.3; No. 2,968, .9; and No. 3,071, 1.6.

EXAMINATIONS OF WATER FROM BELLAIRE.

PARTS PER MILLION.

Sample Number.	Collected.	Color.	Turbidity.	Sediment.	Odor.	Nitrogen as			
						Albuminoid Ammonia.	Free Ammonia.	Nitrites.	Nitrates.
2740	April 13, 1903	60?	225	consid'r'ble	earthy & veg'tive	.182	.152	.002	none
2796	June 1, 1903	50	87	consid'r'ble	2 earthy	.130	.040	none	none
2841	June 29, 1903	65	680	much	2 earthy & veg.	.450	.046	none	.8
2968	Aug. 11, 1903	42	20	slight	faint vegetative	.100	.036	none	trace
3071	Sept. 7, 1903	45	24	slight	earthy & veg'tive	.192	.070	trace	trace
3155	Oct. 8, 1903	30	Dec.	slight	none	.109	.038	.006	.3
3341	Dec. 7, 1903	30	10	slight	none	.184	.142	trace	trace
	Average.....	46	174			.192	.075	.001	.2

Sample Number.	Oxygen Required.	Chlorine.	Alkalinity.	Incrusting Constituents.	Residue on Evaporation.		Bacteria.	
					Total Solids.	Suspended Solids.	No. per cc.	Intestinal bacteria present in 1 cc.
2740	7.54	1.6	64	39	258	92	3,000	Yes
2796	6.74	9.8	24		163	26	1,750	Yes
2841	12.84	8.3	38	26	639	.509	4,400	Yes
2968	3.86	16.7	27	50	181	trace	850	Yes
3071	7.25	8.7	39	32	143	6	650	Yes
3155	2.84	27.9	37	76	223	trace	1,400	Yes
3341	5.44	18.3	38	10	161	trace	7,900	Yes
Average	6.67	13.0	38	39	253		2,850	

EXAMINATIONS OF WATERS FROM MOUNDSVILLE, W. VA.

PARTS PER MILLION.

Sample number.	Collected.	Color.	Turbidity.	Sediment.	Odor.	Nitrogen as			
						Albuminoid ammonia.	Free ammonia.	Nitrites.	Nitrates.
2679	Feb. 9, 1903	32	110	distinct	3 earthy	.186	.018	.003	1.0
2680	Feb. 9, 1903	trace	none	none	none	.033	.005	none	none

Sample number.	Oxygen required.	Chlorine.	Alkalinity.	Incrusting constituents.	Residue on evaporation.		Bacteria.	
					Total.	Loss on ignition.	No. per cc.	Intestinal bacteria present in 1 cc.
2679	6.20	3.5	17	18	129	37	5,500	Yes
2680	.73	14.5	50	39	178	40	100	No

WATER SUPPLY OF DEFIANCE.

The supply for this city is derived from the Maumee River above local sewage pollution and is pumped to a standpipe. See Thirteenth Annual Report of the Ohio State Board of Health, for 1898, page 476. The engineer's report referred to says the water is not used for domestic purposes chiefly on account of its muddiness, although some complaint is made because of the introduction of Ft. Wayne, Ind., sewage, some fifty-five miles above.

Eight samples were received from Defiance in 1903. In four of these colon bacilli were present in 1 cc. portions of the water, while in three of the remaining four, intestinal bacteria were not found when 50 cc. of water were taken, thus indicating that part of the time the water is not materially polluted with sewage. The number of bacteria is usually high (average 3,775 per cc.) on account of the presence of organic matter and surface washings in the river water. This water is high in vegetative organic matter as is shown by the present results and by those obtained from the Maumee River in the investigation of 1898. (Thirteenth Annual Report of Ohio State Board of Health, 1898, page 372.)

The results obtained during 1898 and 1903 agree very well in most particulars and may be taken as indicative of the character of the supply. No sample was obtained either in 1898 or 1903 that was free from

turbidity, while some were decidedly turbid, thus indicating how unsatisfactory and displeasing this water is in appearance. While the waters were turbid most of them did not contain large amounts of suspended solids, the turbidity being due to finely divided material, the coarser having been removed.

The Defiance water is moderately hard with a comparatively low amount of material in it that would form a scale in boilers, and it would therefore be preferable to some of our waters with no greater total hardness. The average alkalinity is a little higher than it was five years ago.

The studies made indicate that the water supply of Defiance receives at times some sewage influence although not to such a serious extent as it would if the sources of pollution were closer at hand. Nevertheless this water appears to be muddy much of the time and in addition contains a very large amount of vegetative organic matter. It is not a suitable water for a public supply and will not in its present state find much favor with the consumer. With proper purification this supply could be made an acceptable one, but the results indicate how far the present water comes from fulfilling the clause in the franchise, which reads: "The water * * * and shall at all times be a good, wholesome water, fit for all purposes of domestic and manufacturing uses." Sample No. 2,746 had been passed through a "no germ filter," and in making the averages marked "a" the results from sample 2,746 were omitted.

The suspended solids were determined in samples 2,844 and 3,072 with results of 264 and 74 parts respectively. The determinations for iron gave the following in parts per million: No. 2,746, .5; No. 2,969, 1.5; No. 3,072, 11.0; No. 3,215, .8; and No. 3,345, .6.

EXAMINATIONS OF WATERS FROM DEFIANCE.

PARTS PER MILLION.

Sample number.	Collected.	Color.	Turbidity.	Sediment.	Odor.	Nitrogen as			
						Albuminoid ammonia.	Free ammonia.	Nitrites.	Nitrates
2746	April 13, 1903	65	trace	trace	1 oily	.242	.008	none	none
2747	April 13, 1903	...	...	...	...	...	...	...	...
2810	June 3, 1903	70	64	consid'r'ble	earthy	.366	.052	trace	1.8
2844	June 29, 1903	55	475	much	earthy & veg'tive	.366	.016	none	1.6
2969	Aug. 10, 1903	45?	60	slight	earthy	.270	.077	none	.4
3072	Sept. 5, 1903	42 off	150	consid'r'ble	earthy & veg'tive	.572	.040	trace	1.4
3175	Oct. 12, 1903	50	24	slight	2 earthy	.204	.018	trace	none
3215	Nov. 2, 1903	35	slight	very slight	faint	.212	.026	trace	trace
3345	Dec. 9, 1903	35	20	very slight	none	.242	.134	trace	none
	Average....	50	100			.319 a	.042 a	trace	.7

Sample number.	Oxygen required.	Chlorine.	Alkalinity.	Incrusting constituents.	Residue on evap'ration.		Bacteria.	
					Total.	Loss on ignition.	No. per cc.	Intestinal bacteria present in 1 cc.
2746	10.45	4.4	91	29	190	78		
2747	31.50						4,300	Yes
2810	15.84	11.6	163	51	468		5,900	Yes
2844	12.94	12.1	200		615		10,500	Yes
2969	9.73	31.6	171	60	402		1,150	No
3072	17.77	.8	117	27	391		6,000	Yes
3175	8.74	19.9	84	26	381		475	No
3215	7.89	18.6	242	none	371	136	1,600	No
3345	6.38	35.0	286	none	455	101	275	No
Average.....	13.85 a	16.8	170	28	440a		3,775	

WATER SUPPLY OF FREMONT.

The supply is derived from deep wells, filter galleries, and the Sandusky River. (See Thirteenth Annual Report of the Ohio State Board of Health, 1898, page 442). The sources of pollution are the small villages of Fort Seneca and Ballville, and the city of Tiffin. There have been times when the escape of the waste from the Strawboard company's pond near Tiffin has killed fish, and at such times the presence of dead and decaying fish in large numbers in the river is an added pollution to the Fremont supply.

The investigation of 1898 (Thirteenth Annual Report of the Ohio State Board of Health, page 345) showed the Sandusky River was a polluted stream and so only one sample of river water was obtained this year, but attention was paid to the well water and to the combined water delivered to the consumer. The one sample of river water showed intestinal bacteria in 1 cc. portions, although taken at a time yielding better results chemically than the average of 1898.

In general it may be said of the deep well portion of the supply that it furnishes a usable water as regards organic pollution although the numbers of bacteria were too high at times. From the inorganic side, the deep well water is extremely objectionable. As noted by the analyses for incrusting constituents, it is so excessively high in scale forming matter as to exclude it from the class of suitable waters for a public supply. The hydrant samples show evidences of a mixed supply—exceedingly hard on the one side and polluted with organic matter on the other, although the proportion of river water in some of the later samples was not as great as in the first one, thus diminishing, relatively, the evidences of organic pollu-

tion. The chlorides of this water are derived largely from mineral sources and do not indicate sewage pollution. Intestinal bacteria were present in the hydrant sample of June 2nd in 1 cc. portions and in that of June 29th in 50 cc. In samples No. 3,080 and 3,166, intestinal forms were not found in 50 cc. portions of the water.

The results show that the portion of the supply obtained from the Sandusky River is decidedly objectionable as regards organic pollution, and that the ground water portion is so exceedingly high in scale forming material as to be practically non-usable from a commercial view. Therefore the supply is neither good nor serviceable and should be replaced by a softer, purer water.

In addition to the findings recorded below, iron was present as follows: No. 2,806, river, 1.0 parts; No. 2,804, hydrant, .7 parts; and No. 2,805, wells, 1.4 parts.

EXAMINATIONS OF WATERS FROM FREMONT. (WELLS.)

PARTS PER MILLION.

Sample number	Collected.	Color.	Turbidity.	Sediment.	Odor.	Nitrogen as			
						Albuminoid ammonia.	Free ammonia.	Nitrites.	Nitrates.
2805	June 2, 1903..	20	31	slight +	very faint	.072	.204	.070	.8
2847	June 29, 1903..	8	none	trace	none	.050	.268	.003	.4
3081	Sept. 8, 1903..	5	none	none	none	.054	.272	.004	none
3167	Oct. 12, 1903..	15	trace	trace	faint	.024	.240	.010	.4
Average.....		12				.050	.246	.022	.4

Sample number.	Oxygen required.	Chlorine.	Alkalinity.	Incrusting constituents.	Residue on evaporation.		Bacteria	
					Total.	Loss on ignition.	No. per cc.	Intestinal bacteria present in 1 cc.
2805	1.31	30.9	164	650	1,630	428	3,200	No
2847	.75	31.5	179	658	1,802	370	550	No
3081	.43	35.2	186	710	1,615	364	1,400	No
3167	1.06	33.0	218	714	1,509		60	No
Average..	.88	32.6	187	683	1,639	387	1,302	

EXAMINATIONS OF WATERS FROM FREMONT. (HYDRANT AND RIVER.)

PARTS PER MILLION.

Sample number.	Collected.	Color.	Turbidity.	Sediment.	Odor.	Nitrogen as			
						Albuminoid ammonia.	Free ammonia.	Nitrites.	Nitrates.
2804	June 2, 1903	46	31	slight	faint vegetative	.188	.011	none	.8
2848	June 29, 1903	26	20	slight	earthy	.170	.040	.002	1.8
3080	Sept. 8, 1903	27 off	13	slight	faint earthy	.200	.028	.002	trace
3166	Oct. 12, 1903	35	85	decided	2 earthy	.194	.112	.022	.6
	Average....	34	37			.188	.048	.006	.8
River 2806	June 2, 1903	49	52	considerable	2 earthy	.246	.016	.003	.6

Sample number.	Oxygen required.	Chlorine.	Alkalinity.	Incrusting constituents.	Residue on evaporation.		Bacteria.	
					Total solids.	Loss on ignition.	No. per cc.	Intestinal bacteria present in 1 cc.
2804	4.75	100.4	182	136	710	235	7,400	Yes
2848	4.66	37.4	176	322	972	248	3,100	No
3080	4.70	35.8	171	251	753		600	No
3166	4.20	53.8	210	354	1,068		1,300	No
Average.....	4.58	56.8	185	266	876	242	3,100	
River 2806	6.61	100.6	200	96	667	249	1,500	Yes

EXAMINATIONS OF WATERS FROM FREMONT. (WELLS.)

PARTS PER MILLION.

Sample number.	Collected.	Chlorine.	Nitrogen as		Bacteria.	
			Nitrites.	Nitrates.	No. per cc.	Intestinal bacteria present in 1 cc.
3170	Oct. 12, 1903.....	45.2	.003	none	100	No
3171	Oct. 12, 1903.....	29.6	.004	none	75	No
3172	Oct. 12, 1903.....	41.8	.010	none	240	No
3173	Oct. 12, 1903.....	35.2	.008	1.4	100	No
3174	Oct. 12, 1903.....	32.3	.003	.4	80	No
Average		36.8	.006	.4	119	

WATER SUPPLY OF MINGO JUNCTION.

This supply is derived from a submerged crib in the channel of the Ohio River. (See Thirteenth Annual Report of the Ohio State Board of Health, 1898, page 119, or Sixteenth Annual Report, 1901, page 454.) The plan of the proposed supply was approved July, 1898, by the State Board of Health on condition that subsequent investigation did not show an imperfect filtration or a water of poor quality.

In May, 1900, a committee from the State Board of Health investigated the typhoid situation at Mingo Junction and on the report of that committee that the water supply was at fault the former approval of the State Board of Health was withdrawn. (See Fifteenth Annual Report of the Ohio State Board of Health, 1900, pages 47-49.)

A study of the river and hydrant waters from Mingo Junction in 1901 (Sixteenth Annual Report of the Ohio State Board of Health, 1901, pages 340, 381, 387) showed that the water derived from the crib was in part filtered river water, and in part a subsoil water. The subsoil water showed the evidences of pollution from Mingo Junction itself, and the river water was not perfectly filtered at all times. While the Mingo Junction supply may be usable more or less of the time, it is certain that this village is in danger from a faulty filtration of a polluted river water on the one hand, and on the other subject to the danger of drawing a portion of its supply from the polluted subsoil water of the village, and the latter may at any time fail to receive proper purification before reaching the crib. The analyses of 1903 agree very well with those of 1901 in most respects and indicate that dangers are still existing.

The wide variations in many of the chemical as well as bacterial findings are not consistent with a thorough, efficient filtration. The number of bacteria in the hydrant water varied from a satisfactory 65 per cc. to a decidedly objectionable 10,000 per cc. with an average of over 4,000. Intestinal bacteria were present in 1 cubic centimeter portions of the hydrant water in 4 of the 7 samples examined bacteriologically.

These studies show that the filtration at Mingo Junction is only partial, that it should be known as such, and that it, as there existing, is not a safeguard against a polluted water, although it does produce some purification. The supply cannot be looked upon as a safe one.

EXAMINATIONS OF WATERS FROM MINGO JUNCTION.

PARTS PER MILLION.

Sample number.	Collected.	Color.	Turbidity.	Sediment.	Odor.	Nitrogen as			
						Albuminoid ammonia.	Free ammonia.	Nitrites.	Nitrates.
2726	April 3, 1903	10	16	slight	none	.056	.028	none	none
2799	June 1, 1903	10	ac	trace	faint earthy	.022	.006	.002	1.27
2850	July 2, 1903	9	ac	trace	2 faint musty	.108	.036	trace	.6
2978	Aug. 17, 1903	23	15	mere trace	faint earthy	.068	.003	none	.6
3083	Sept. 9, 1903	22	15	trace	faint	.118	.011	trace	.6
3176	Oct. 12, 1903	5	mere trace	very slight	none	.060	.016	trace	1.0
3220	Nov. 4, 1903	5	none	mere trace	faint musty	.152	.020	trace	trace
3344	Dec. 9, 1903	none	none	none	none	.032	.004	trace	1.0
Average.....						.077	.015		.6

Sample number.	Oxygen required.	Chlorine.	Alkalinity.	Incrusting constituents.	Residue on evaporation.		Bacteria.	
					Total.	Loss on ignition.	No. per cc.	Intestinal bacteria present in 1 cc.
2726	1.48	13.3	52		196			
2799	1.82	21.7	59	84	248		1,500	Yes
2850	2.02	19.2	52	36	212		10,000	Yes
2978	2.46	22.7	55	72	198		4,700	Yes
3083	2.52	18.2	54	77	216		3,300	No
3176	1.72	27.4	53	96	221		10,500	No
3220	2.26	22.0	58	100	237	51	550	Yes
3344	1.70	22.0	59	46	242	56	65	No
Average.....		20.8	55	73	221		4,374	

WATER SUPPLY OF PORT CLINTON.

For description of system see Thirteenth Annual Report of the Ohio State Board of Health, 1898, page 554. The supply is derived from Lake Erie through a crib near the harbor. The crib is so arranged as to give a filtering or better a straining action through some 9 feet of gravel.

The examinations of 1901 (see Sixteenth Annual Report of the Ohio State Board of Health, 1901, pages 396 and 497) showed the crib exerted no more than a straining influence, as the reduction in the hydrant water of the oxygen required findings was only 16 per cent. and the albuminoid ammonia 19 per cent. The results of 1901 did not give much evidence of sewage pollution, but rather of pollution from vegetative material, salt, and suspended soil. The eight samples from Port Clinton hydrants during 1903 have been in general similar to those of 1901, and bear out the conclusions then reached. It might be said that the present average indicates less turbidity and suspended matter, but a little more organic pollution, more influence from salt, a greater fluctuation in the number of bacteria, and therefore on the whole a less desirable water. Colon bacilli were found in two samples this year in 1 cc. portions, and also in two others when 50 cc. of the water were used for the test. The chlorides of this supply are not indicative of the amount of domestic sewage, but come from industrial sources of which the fisheries are chief. The average of 39.6 for chlorine is several times that of the normal Lake Erie water.

These studies show that the present Port Clinton supply is undesirable because of its appearance and of some of the substances it contains. The results indicate that it is probably free from sewage pollution much of the time, but that it is open to such pollution at times cannot be questioned. Reliance should not be placed on a straining process which has so poor a claim to being a filter, and it should be known to the citizens that the present crib at Port Clinton offers practically no protection against a sewage polluted water. This crib is not a filter that will remove the bacteria, nor is it a satisfactory substitute for filtration. It would be a wise move for Port Clinton, to avoid the use of a water, so objectionable at times in appearance, by a proper method of removing the suspended matter and at the same time insure them against the evils of a sewage pollution which may come to them unexpectedly with the conditions as they are at present.

In addition to the findings given in the table, the suspended solids in Nos. 2,741 and 3,073 were 115 and 53. The iron determinations were 5.5, 1.1, and .6 for Nos. 2,741, 3,073, and 3,218 respectively.

EXAMINATIONS OF WATERS FROM PORT CLINTON.

PARTS PER MILLION.

Sample number.	Collected.	Color.	Turbidity.	Sediment.	Odor.	Nitrogen as			
						Albuminoid ammonia.	Free ammonia.	Nitrites.	Nitrates.
2741	April 13, 1903	40?	237	consider'ble	2 earthy	.254	.028	.003	trace
2807	June 2, 1903	36?	56	slight	faint earthy	.134	.005	none	trace
2845	June 29, 1903	20	16	slight	faint veget'tive	.218	.012	none	.4
2970	Aug. 10, 1903	20						none	none
3073	Sept. 7, 1903	21	16	trace +	earthy	.160	.018	none	none
3208	Oct. 27, 1903	10	118	slight	none	.138	.012	.002	none
3218	Nov. 3, 1903	20	slight	trace	none	.088	.030	trace	none
3343	Dec. 8, 1903	15	10	slight	faint	.080	.046	trace	none
Average		23	75			.153	.021	.001	trace

Sample number.	Oxygen required.	Chlorine.	Alkalinity.	Incrusting constituents.	Residue on evaporation.		Bacteria.	
					Total.	Loss on ignition.	No. per cc.	Intestinal bacteria present in 1 cc.
2741	8.13	50.0	104	41	388		900	No
2807	4.29	71.4	90		345		15,000	Yes
2845	3.32	18.5	104	17	222		950	No
2970		38.1					275	Yes
3073	2.68	59.4	89	28	255		200	No
3208	2.50	13.1	116	16	217		350	No
3218	1.46	10.7	107	none	157	67	240	No
3343	1.64	55.8	107	none	237	75	50	No
Average..	3.43	39.6	102	17	260		2,245	

WATER SUPPLY OF SANDUSKY.

This supply is derived from Sandusky Bay and the water is used without other treatment than the slight sedimentation it may receive in the standpipe. (See Thirteenth Annual Report of the Ohio State Board of Health, 1898, page 446.) The bay receives the sewage polluted water of Sandusky River and what is of more importance, the sewage of the city of Sandusky. Currents may favor, much of the time, the passage of the worst of this pollution in other directions than toward the intake, but they

are not assured. The eight samples received this year show a somewhat more objectionable water than the investigation of 1898. (See Thirteenth Annual Report of the Ohio State Board of Health, 1898, page 368). The present average shows an increase in turbidity and at times the water was muddy. The present analyses indicate a decided increase in organic matter and it is to be noted the chlorides run higher. The number of bacteria is higher by an increase of 50 per cent in the average. Intestinal bacteria were found in 1 cc. portions of 5 of the samples and in each of the other three where the amount of water tested was 50 cc.

These findings by their marked increase over the normal of Lake Erie water show how objectionable the Sandusky supply is, because of its unsightly appearance, because of the organic matter it carries most of the time, and because of the danger there is of epidemic disease which may come with very slight modification of existing conditions. It does seem that Sandusky has been especially fortunate to escape the serious affliction (epidemic typhoid fever) that has visited three of our Lake Erie cities in recent years, viz.: Conneaut, Lorain and Cleveland. How much better it would be if Sandusky would install a properly purified water supply before instead of after the sacrifice of many lives by a water borne but preventable disease.

In addition to the tabulated findings below the suspended solids and iron of No. 2,743 were 6.2 and 5.8 respectively, while the iron in samples 2,960 and 3,210 was .7 and .9.

EXAMINATIONS OF WATERS FROM SANDUSKY.

PARTS PER MILLION.

Sample number.	Collected.	Color.	Turbidity.	Sediment.	Odor.	Nitrogen as			
						Albuminoid ammonia.	Free ammonia.	Nitrites.	Nitrates.
2743	April 13, 1903	35	205	decided	earthy	.240	.026	.004	none
2801	June 1, 1903	30 ?	240	2 consid'ble	1 earthy	.238	.008	none	trace
2843	June 29, 1903	22						.004	.3
2960	Aug. 10, 1903	17	31	trace	earthy	.144	.008	none	none
3078	Sept. 8, 1903	27 off	28	slight	faint earthy	.232	.032	none	none
3158	Oct. 9, 1903	10	175	decided	none	.236	.010	none	none
3210	Nov. 2, 1903	10	slight	very slight	none	.154	.018	trace	none
3339	Dec. 7, 1903	10	15	very slight	slight earthy	.162	.038	trace	none
Average . . .		20	99			.201	.020		

Sample number.	Oxygen required.	Chlorine.	Alkalinity.	Incrusting constituents.	Residue on evaporation.		Bacteria.	
					Total.	Loss on ignition.	No. per cc.	Intestinal bacteria present in 1 cc.
2743	6.64	11.2	93	48	269		600	No
2801	9.36	5.7	93		364		1,300	Yes
2843		13.9	104				375	No
2960	3.48	9.2	99	39	220		650	Yes
3078	4.89	9.3	94	49	244		275	No
3158	4.48	12.5	118	43	270		1,000	Yes
3210	4.02	22.5	116	77	276	128	600	Yes
3339	1.74	14.4	124	none	198	51	2,600	Yes
Average...	4.94	12.3	105	43	263		925	

WATER SUPPLY OF TIFFIN.

The supply is derived from a series of drilled wells, supplemented at times by untreated water from the Sandusky River. (See Thirteenth Annual Report of the Ohio State Board of Health, 1898, page 441). The Sandusky River at this point is not suitable for addition to a public supply without purification. (See analyses, Thirteenth Annual Report of the Ohio State Board of Health, 1898, page 366). There is no reason for thinking that the water obtained from the waterworks wells is polluted by organic matter and its only objectionable feature is due to its inorganic pollution, for it is a hard water. Nine samples of the hydrant water were received, but we have no information as to whether river water was being used or had been used except that yielded by the analyses. By comparison with the work of 1898, most of the 1903 results would indicate that a large quantity of river water was not being added although some certainly was introduced as is unquestionably shown by the analyses.

Intestinal bacteria were present in 1 cc. portions of 2 of the samples and in 4 more when 50 cc. of the water were used for the test. The chlorine determinations of both river and wells are high, due to mineral influences.

The results show that the water of the Tiffin supply is made objectionable in appearance, or in quality, or both, by the addition of water from the Sandusky River. If such addition continues to be made, the river water ought to be first purified. The well water is greatly to be preferred for domestic purposes on account of its freedom from organic pollution, but it is some harder than the river water.

The determinations for iron in samples 2,748, 2,802, 2,962, 3,074, and 3,217 resulted as follows in parts per million: .9, .1, .5, .3, and .4 respectively.

EXAMINATIONS OF WATERS FROM TIFFIN.

PARTS PER MILLION.

Sample number.	Collected.	Color.	Turbidity.	Sediment	Odor.	Nitrogen as			
						Albuminoid ammonia.	Free ammonia.	Nitrites.	Nitrates.
2695	Mar. 4, 1903	50 off	180	consid'r'ble	2 earthy	.166	.008	none	2.6
2748	April 13, 1903	16	very slight	very slight	2 oily	.068	.003	none	5.6
2802	June 1, 1903	17	trace	none	very faint	.044	.006	.003	trace
2846	June 29, 1903	17	trace	trace	vegetative	.100	.020	none	.6
2962	Aug. 10, 1903	20	trace	trace	none	.088	.016	none	.6
3074	Sept. 7, 1903	28	trace	none	very faint	.106	.031	none	none
3163	Oct. 12, 1903	15	none	none	none	.062	.016	.004	none
3217	Nov. 2, 1903	20	none	none	mushrooms	.080	.016	trace	none
3338	Dec. 7, 1903	trace	very slight	none	none	.092	.016	.002	trace
Average		21				.089	.015	.001	1.0

Sample number.	Oxygen required.	Chlorine.	Alkalinity.	Incrusting constituents.	Residue on evaporation.		Bacteria.	
					Total.	Loss on ignition.	No. per cc.	Intestinal bacteria present in 1 cc.
2695	7.32	10.4	163		436		22,000	No
2748	2.86	14.3	225	65	411	124	500	Yes
2802	2.20	64.0	239	100	594	158	160	No
2846	2.53	46.7	241	73	565		140	No
2962	3.03	93.3	220	113	605		180	No
3074	2.27	110.4	212	113	636		100	No
3163	1.51	150.0	291	141	746		400	Yes
3217	1.88	193.6	258	158	912	229	700	No
3338	2.90	106.0	304	121	694	131	70	No
Average..	2.94	87.6	239	110	622	160	2,694	

WATER SUPPLY OF ZANESVILLE.

The source of the supply is the Muskingum River. The water is pumped to reservoirs and standpipe. (See Thirteenth Annual Report of the Ohio State Board of Health for 1898, page 544.)

A summary of the sewage pollutions above Zanesville is given on pages 678 and 679 of the Annual Report of the Ohio State Board of Health for 1899. Eight samples of hydrant water from Zanesville were received this year and comparison shows them to be much like those ob-

tained in the 1899 river investigation. The present samples are much higher in chlorides, showing the influence from salt pollution. That the chlorine is higher now than formerly is due to the sinking of oil wells on the territory of the Muskingum watershed and the discharge of salt water therefrom.

While much of the sewage pollution above Zanesville is remote in distance, it does not mean that the water of that city is not dangerous. Intestinal bacteria were present in 1 cc. portions of five of the eight samples received this year. The pollution is not growing less, and, consequently, each year sees the city under greater danger on this account. With a supply open to a sewage pollution, containing much organic matter, and an unbearable amount of mud at times and rarely, perhaps never, clear it would seem that the citizens of Zanesville have waited long enough for an improved supply. The condemnation of the present supply from the work of 1899 (see the report of the State Board of Health for that year, pages 516, 609, 610) is only strengthened by the studies of 1903. To the credit of Zanesville let it be said that measures have been considered to remedy the evil. Plans for a new supply from wells on the west side of the Muskingum River were approved early in 1900, but later abandoned. (See Fifteenth Annual Report of the Ohio State Board of Health, page 112). Later in the year plans were under discussion for improving the supply by means of mechanical filtration, but legal complications arose and the matter is still pending.

The suspended solids were determined on samples 2,742, 2,797, 2,842 and 3,075 and found to be 547, 54, 52, and 28 respectively. The determinations for iron in samples 2,742, 2,955, 3,075, and 3,216 were 16.0, .7, 1.8, and 1.2.

EXAMINATIONS OF WATERS FROM ZANESVILLE.

PARTS PER MILLION.

Sample number.	Collected.	Color.	Turbidity.	Sediment.	Odor.	Nitrogen as			
						Albuminoid ammonia.	Free ammonia.	Nitrites.	Nitrates.
2742	April 13, 1903	90 off	1000	much	3 earthy	.550	.023	.002	3.6
2797	June 1, 1903	45	95	considerable	2 earthy	.220	.012	.002	.8
2842	June 29, 1903	50	113	considerable	earthy & vegetative	.208	.038	none	.8
2955	Aug. 10, 1903	24	16	trace	earthy	.094	.010	none	trace
3075	Sept. 8, 1903	35	64	considerable	vegetative	.252	.034	none	.4
3152	Oct. 7, 1903	25	90	slight	none	.119	.012	trace	trace
3216	Nov. 2, 1903	15	85	slight	none	.106	.024	.024	trace
3340	Dec. 7, 1903	20	20	very slight	trace	.120	.028	trace	.8
Average....		38	172			.209	.022	.003	.8

Sample number.	Oxygen required.	Chlorine.	Alkalinity.	Incrusting constituents.	Residue on evaporation.		Bacteria.	
					Total.	Loss on ignition.	No. per cc.	Intestinal bacteria present in 1 cc.
2742	17.53	4.8	43	49	649		13,400	Yes
2797	4.44	39.5	103		352		6,500	Yes
2842	3.63	28.2	106	36	314		2,200	Yes
2955	2.47	58.1	125	48	338		550	Yes
3075	5.06	49.6	102	70	345		325	Yes
3152	2.33	91.1	170		458		350	No
3216	2.19	72.0	154	62	351	139	600	No
3340	2.58	65.2	163	42	379	85	1,200	No
Average.....	5.03	56.1	121	51	411	112	3,141	

REPORT ON OCCASIONAL EXAMINATIONS OF EXISTING PUBLIC WATER SUPPLIES.

WATER SUPPLY OF AKRON.

The supply is from a series of wells and Summit Lake.^a A sample of "city" water was received in connection with a sample from a private well to be examined for pollution. The analysis showed some undesirable features, but the sample was not collected in a laboratory (i. e., a "tested") container. The chlorides come largely from mineral sources. The intestinal bacteria could have come from the lake.

EXAMINATION OF WATER FROM AKRON.

PARIS PER MILLION.

Sample number.	Date collected.	Color.	Turbidity.	Sediment.	Odor.	Nitrogen as			
						Albuminoid ammonia.	Free ammonia.	Nitrites.	Nitrates.
2700	Mar. 12, 1903	55	....	trace	whiskey	.092	.006	none	none

Sample number.	Oxygen required.	Chlorine.	Alkalinity.	Total solids.	Bacteria.	
					No. per cc.	Intestinal present.
2700	6.35	110.6	113	424	4,800	Yes

(a) See Thirteenth Annual Report, 1898, page 573, also Sixteenth Annual Report, 1901, page 130.

WATER SUPPLY OF ALLIANCE.

See special investigation elsewhere.

WATER SUPPLY OF ARLINGTON HEIGHTS.

See Wyoming.

WATER SUPPLY OF ASHTABULA.

The supply is derived from Lake Erie with practically no improvement in condition. See special investigation of Lake Erie supplies in Sixteenth Annual Report of Ohio State Board of Health, 1901. For details of waterworks system see Thirteenth Report, 1898, page 546.

On account of the presence of typhoid fever in the city, request was made by the board of health for examinations of the hydrant water. The results indicated a usable water at the time of sampling, but did not assure a pure water under the influence of other currents in the lake.

EXAMINATION OF WATER FROM ASHTABULA.

PARTS PER MILLION.

Sample number.	Date collected.	Color.	Turbidity.	Sediment.	Odor.	Nitrogen as			
						Albuminoid ammonia.	Free ammonia.	Nitrites.	Nitrates.
2721	April 1, 1903...	30 off	123	considerable	1 earthy	.128	.012	none	trace

Sample number.	Oxygen required.	Chlorine.	Alkalinity.	Total solids.	Bacteria.	
					No. per cc.	Intestinal present.
2721	4.19	3.3	72	187	240	No

WATER SUPPLY OF ATHENS.

The supply was derived from a dug well, but the intention was to increase it by the addition of driven wells. See Sixteenth Annual Report, 1901, page 432. No analysis of the water had been made by the State Board of Health and a sample was requested and obtained through the local board of health. The examination shows a potable water.

EXAMINATION OF WATER FROM ATHENS.

PARTS PER MILLION.

Sample number.	Date collected.	Color.	Turbidity.	Sediment.	Odor.	Iron.	Nitrogen as			
							Albuminoid ammonia.	Free ammonia.	Nitrites.	Nitrates.
2708	Mar. 30, '03..	8	trace	trace	none	.15	.032	.012	.002	3.0

Sample number.	Oxygen required.	Chlorine.	Alkalinity.	Incrusting constituents.	Total solids.	Bacteria.	
						No. per cc.	Intestinal present.
2708	1.08	19.0	177	29	302	19	No

WATER SUPPLY OF BELLAIRE.

See special investigation elsewhere.

WATER SUPPLY OF BLUFFTON.

The supply is from a series of drilled wells with an emergency intake to an old stone quarry. See Thirteenth Annual Report, 1898, page 482. A sample of the hydrant water was received with samples from private wells, on account of a request by the local board of health. Typhoid fever was present in the village. The emergency intake was in use at the time of sampling or had been. The analysis gave indication of some pollution and would cause the water to be suspicious if there was opportunity for pollution of the stone quarry by sewage from human beings.

EXAMINATION OF WATER FROM BLUFFTON.

PARTS PER MILLION.

Sample number.	Date collected.	Color.	Turbidity.	Sediment.	Odor.	Iron.	Nitrogen as			
							Albuminoid ammonia.	Free ammonia.	Nitrites.	Nitrates.
2663	Jan. 5, 1903..	15	very sl'ht	very sl'ht	1 oily	.35	.064	.182	.005	none

Sample number.	Oxygen required.	Chlorine.	Alkalinity.	Incrusting constituents.	Residue on evaporation.		Bacteria.	
					Total.	Loss on ignition.	No. per cc.	Intestinal present.
2663	2.12	36.5	292	142	767	215	150	Yes

WATER SUPPLY OF BOND HILL.

See St. Bernard.

WATER SUPPLY OF BRYAN.

The supply is from a series of drilled wells. See Thirteenth Annual Report, page 483. As no analysis had been made, the local board of health sent a sample at the request of the State Board of Health. Some iron was present in the sample, but the results indicate a potable water.

EXAMINATION OF WATER FROM BRYAN.

PARTS PER MILLION.

Sample number.	Date collected.	Color.	Turbidity.	Sediment.	Odor.	Iron.	Nitrogen as			
							Albuminoid ammonia.	Free ammonia.	Nitrites.	Nitrates.
2709	Mar. 30, '03..	20	very sl'ht	consid- erable	faint earthy	1.2	.044	.464	.001	none

Sample number.	Oxygen required.	Chlorine.	Alkalinity.	Incrustring constituents.	Total solids.
2709	1.57	8.6	294	none	491

WATER SUPPLY OF CAMBRIDGE.

The supply is derived from two large dug wells in the bottom land near Wills-Creek, the change having been made from the stream to the wells late in 1899. A sample of the hydrant water was requested of the local board of health at a time when they were sending some samples from private wells to be examined on account of typhoid. The hydrant water has not improved with use, and though still preferable to the water of Wills Creek the analysis shows it is undesirable.

EXAMINATION OF WATER FROM CAMBRIDGE.

PARTS PER MILLION.

Sample number.	Date collected.	Color.	Turbidity.	Sediment.	Odor.	Iron.	Nitrogen as			
							Albuminoid ammonia.	Free ammonia.	Nitrites.	Nitrates.
3105	Sept. 17, '03..	30	sli'ht	sli'ht	3 earthy	1.0	.362	.152	.010	none

Sample number.	Oxygen required.	Chlorine.	Alkalinity.	Incrustring constituents.	Residue on evaporation.		Bacteria.	
					Total.	Loss on ignition.	No. per cc.	Intestinal present.
3105	6.24	30.2	182	33	833	264	1,500	not in 50cc

WATER SUPPLY OF CANTON.

See description in Thirteenth Annual Report of State Board of Health, 1898, page 576. The supply was derived from drilled wells and

the west branch of Nimishillen Creek. Additional wells have been installed since, so as to avoid the necessity of drawing on the stream. Examination of a sample of the hydrant water showed its potability. It is a little harder than some former samples, but with less iron present.

EXAMINATION OF WATER FROM CANTON.

PARTS PER MILLION.

Sample number.	Date collected.	Color.	Turbidity.	Sediment.	Odor.	Iron.	Nitrogen as			
							Albuminoid ammonia.	Free ammonia.	Nitrites.	Nitrates.
2958	Aug. 10, '03...	18	trace	slight trace	faint	.5	.034	.158	none	none

Sample number.	Oxygen required.	Chlorine.	Alkalinity.	Incrusting constituents.	Total solids.	Bacteria.	
						No. per cc.	Intestinal present.
2958	.79	6.5	248	65	365	36	No.

WATER SUPPLY OF CAREY.

The supply is derived from drilled wells. See Thirteenth Annual Report, 1898, page 442. Examination was made, as no analysis of the water has been recorded. It is a potable water, though not soft.

EXAMINATION OF WATER FROM CAREY.

PARTS PER MILLION.

Sample number.	Date collected.	Color.	Turbidity.	Sediment.	Odor.	Iron.	Nitrogen as			
							Albuminoid ammonia.	Free ammonia.	Nitrites.	Nitrates.
2751	April 17, '03	5	none	none	none	.3?	.038	.008	none	5.6

Sample number.	Oxygen required.	Chlorine.	Alkalinity.	Incrusting constituents.	Residue on evaporation.		Bacteria.	
					Total.	Loss on ignition.	No. per cc.	Intestinal present.
2751	.92	1.3	242	11	356	89	140	No.

WATER SUPPLY OF CARTHAGE.

The supply is derived from drilled wells. See Sixteenth Annual Report, 1901, page 435. Elmwood Place is supplied with water from the Carthage plant. A sample from a hydrant was requested of the local board as the State Board of Health had had no analysis. The results show a potable water, although not soft.

EXAMINATION OF WATER FROM CARTHAGE.

PARTS PER MILLION.

Sample number.	Date collected.	Color.	Turbidity.	Sediment.	Odor.	Iron.	Nitrogen as			
							Albuminoid ammonia.	Free ammonia.	Nitrites.	Nitrates.
2710	Mar. 30, '03	11	20	considerable	earthy	.8	.031	.050	.002	2.2

Sample number.	Oxygen required.	Chlorine.	Alkalinity.	Incrusting constituents.	Total solids.	Bacteria.	
						No. per cc.	Intestinal present.
2710	1.09	7.6	284	29	440	none	No.

WATER SUPPLY OF CLYDE.

For a full description of the waterworks see Sixteenth Annual Report of Ohio State Board of Health, 1901, page 438. The supply is derived from a deep well, with a reservoir for emergency purposes. A second emergency intake leads to Raccoon Creek. Sample No. 3,052 is representative of the waterworks well; No. 3,053, a hydrant; No. 3,054, the reservoir; No. 3,055, a pond fed by Raccoon Creek.

These samples were requested of the local board by the State Board of Health, as no previous examination of these waters was available. The results show the hydrant water is suitable for drinking purposes as far as organic pollution is concerned, but it is high in inorganic matter and too extremely hard for commercial uses. The reservoir water shows some organic pollution and is also a very hard water. The creek water shows pollution and should not be added to the public supply. It is much softer than the others, but not free from scale forming material.

EXAMINATION OF WATERS FROM CLYDE.

PARTS PER MILLION.

Sample number.	Collected.	Color.	Turbidity.	Sediment.	Odor.	Iron.	Nitrogen as			
							Albuminoid ammonia.	Free ammonia.	Nitrites.	Nitrates.
3052	1903 Aug. 30	5	trace	mere trace	none	.7	.034	.132	none	none
3053	Aug. 30	5	20	slight	ft. earthy	1.7	.038	.024	.003	trace
3054	Aug. 30	10	slight	slight	vegetative	.55	.192	.006	none	trace
3055	Aug. 30	50	103	consid.	vegetative	5.0	.476	.030	none	1.6

Sample number.	Oxygen required.	Chlorine.	Alkalinity.	Incrusting constituents.	Residue on evaporation.		Bacteria.	
					Total.	Loss on ignition.	No. per cc.	Intestinal bacteria present in 1 cc.
3052	1.24	19.4	213	1009	1929	493	5300	No
3053	1.32	19.4	213	913	1926	490	110	No
3054	4.62	77.1	102	838	1581	340	2200	No ^a
3055	17.01	trace	75	105	294	108	8500	Yes

a Colon bacilli present in 50 cc.

WATER SUPPLY OF COLUMBUS.

For a full description of the supply see Annual Report of the State Board of Health for 1898, page 578. Water is derived from driven wells, filter basins, filter galleries, Scioto River and Alum Creek.

Examinations were made at various times as follows:

BACTERIOLOGICAL EXAMINATION OF COLUMBUS WATER FROM FAUCET IN
LABORATORY OF THE STATE BOARD OF HEALTH 1903.

Sample number.	Date collected.	Hour.	Appearance of sample.	No. of bacteria per cc.	Remarks.
2669	Jan. 21	12:15 p.m.	Clear.	850	No colon.
2683	Feb. 13	5:00 p.m.	Nearly clear.	275	No colon.
2685	Feb. 14	10:00 a.m.	Nearly clear.	225	No colon.
2729	Feb. 20	2:00 p.m.	Nearly clear.	550	
2694	Feb. 28	8:00 a.m.	Nearly clear.	15,000	
2702	Mar. 18	3:00 p.m.	Nearly clear.	225	
2703	Mar. 24	8:15 a.m.	Hazy.	400	No colon.
2704	Mar. 25	8:00 a.m.	Clear.	130	
2705	Mar. 26	11:00 a.m.	Clear.	120	
2706	Mar. 27	12:15 p.m.	Hazy.	85	No colon.
2707	Mar. 30	1:00 p.m.	Roiled.	800	Colon present.
2712	Mar. 31	9:30 a.m.	Nearly clear.	90	Chemical also.
2719	April 1	1:30 p.m.	Nearly clear.	275	No colon.
2722	April 2	1:30 p.m.	Nearly clear.	1,300	
2723	April 3	10:00 a.m.	Nearly clear.	425	
2728	April 4	10:00 a.m.	Cloudy.	4,500	
2737	April 8	10:00 a.m.	Clear.	800	
2738	April 10	9:00 a.m.	Clear.	350	
2745	April 14	10:30 a.m.	Clear.	900	Colon present in 1cc.
2749	April 15	10:30 a.m.	Hazy.	2,400	Colon present in 1cc.
2753	April 20	10:00 a.m.	Nearly clear.	120	Colon not present in 1cc.
2762	April 21	5:00 p.m.	Hazy.	1,600	
2763	April 22	2:30 p.m.	Hazy.	600	
2768	April 28	3:00 p.m.	Clear.	400	
2776	April 30	5:00 p.m.	Clear.	600	
2778	May 2	11:00 a.m.	Hazy.	500	
2780	May 5	5:00 p.m.	Clear.	500	No colon
2781	May 7	8:30 a.m.	Hazy.	8,800	
2785	May 12	11:00 a.m.	Nearly clear.	400	
2786	May 12	11:45 a.m.	Clear.	300	
2794	May 27	10:00 a.m.	Clear.	countless	
2803	June 2	11:00 a.m.	Clear.	130	
2809	June 3	3:30 p.m.	Clear.	420	
2811	June 4	1:45 p.m.	Hazy.	300	
2814	June 5	8:30 a.m.	Hazy.	1,100	Chem. also. Colon present.
2817	June 10	2:30 p.m.	Clear.	450	
2820	June 12	8:30 a.m.	Clear.	450	
2840	July 29	4:30 p.m.	Clear.	600	
2851	July 3	10:00 a.m.	Hazy.	600	
2879	July 7	5:00 p.m.	Cloudy.	350	Colon present.
2885	July 10	5:00 p.m.	Nearly clear.	400	
2890	July 14	3:00 p.m.	Nearly clear.	350	
2908	July 15	11:00 a.m.	Faint cloudy.	1,100	

BACTERIOLOGICAL EXAMINATIONS OF COLUMBUS WATER—Concluded.

Sample number.	Date collected.	Hour.	Appearance of sample.	No. of bacteria per cc.	Remarks.
2900	July 17	2:00 p.m.	Nearly clear.	550	Colon present. Chem. also.
2924	July 23	4:30 p.m.	Nearly clear.	325	No colon.
2926	July 24	4:00 p.m.	Nearly clear.	130	
2937	Aug. 3	.....	.....	500	
2948	Aug. 5	4:00 p.m.	.....	450	
2971	Aug. 12	4:00 p.m.	Nearly clear.	1,000	
2973	Aug. 13	2:00 p.m.	Hazy.	450	No colon.
2979	Aug. 18	4:00 p.m.	Nearly clear.	200	Colon present in 50cc.
2982	Aug. 21	9:30 a.m.	Nearly clear.	1,200	Colon present in 1cc
3064	Sept. 2	10:00 a.m.	Cloudy.	1,250	Colon present in 1cc.
3066	Sept. 3	.....	Cloudy.	650	Colon present in 1 and 50 cc. Chemical also.
3069	Sept. 5	.....	Cloudy.	350	Colon present in 1cc.
3070	Sept. 8	1:30 p.m.	Cloudy.	650	
3079	Sept. 9	10:30 a.m.	Cloudy.	700	
3093	Sept. 14	10:00 a.m.	Cloudy.	375	
3099	Sept. 15	9:00 a.m.	Cloudy.	500	No colon in 1cc.
3104	Sept. 17	3:00 p.m.	Cloudy.	1,900	
3108	Sept. 19	8:30 a.m.	Nearly clear.	31,000	Colon in 50cc. Chem also.
3127	Sept. 24	5:00 p.m.	Nearly clear.	325	
3129	Sept. 25	1:30 p.m.	Nearly clear.	275	Colon in 1cc.
3132	Sept. 26	10:30 a.m.	Nearly clear.	550	Colon in 1cc.
3136	Sept. 30	2:00 p.m.	Nearly clear.	325	
3160	Oct. 10	12:15 p.m.	Nearly clear.	850	Colon in 1cc.
3179	Oct. 14	5:30 p.m.	Nearly clear.	160	No colon in 1cc.
3189	Oct. 17	2:15 p.m.	Nearly clear.	600	No colon in 1cc.
3191	Oct. 20	4:00 p.m.	Nearly clear.	650	No colon in 1 or 50cc.
3203	Oct. 25	.....	.....	110	
3213	Nov. 3	1:00 p.m.	Nearly clear.	85	No colon in 1cc.
3219	Nov. 4	4:30 p.m.	Nearly clear.	200	Colon in 1cc.
3221	Nov. 5	2:00 p.m.	Nearly clear.	225	
3230	Nov. 9	1:00 p.m.	Nearly clear.	230	No colon in 1 or 50cc. Chemical also.
3236	Nov. 10	2:15 p.m.	Nearly clear.	300	No colon in 1cc.
3251	Nov. 14	1:30 p.m.	Clear.	130	No colon in 1cc.
3252	Nov. 11	4:00 p.m.	Clear.	190	No colon in 1cc.
3253	Nov. 16	4:00 p.m.	Clear.	250	No colon in 1cc.
3260	Nov. 17	4:00 p.m.	Clear.	650	No colon in 1cc.
3262	Nov. 19	4:00 p.m.	Clear.	190	No colon in 1cc.
3270	Nov. 21	4:00 p.m.	Clear.	60	No colon in 1cc.
3276	Nov. 24	1:00 p.m.	Hazy.	1,000	Colon in 1cc.
3279	Nov. 30	.....	Hazy.	600	No colon in 1cc.
3321	Dec. 4	2:00 p.m.	Hazy.	300	Colon in 1cc.
3348	Dec. 12	10:00 a.m.	Hazy.	325	No colon in 1cc.
3351	Dec. 16	.....	Hazy.	260	No colon in 1cc.
3364	Dec. 24	12:00 p.m.	Cloudy.	13,000	
3420	Dec. 30	5:00 p.m.	Roiled.	27,600	
3421	Dec. 31	8:30 a.m.	Cloudy.	22,000	Chemical also. Colon present in 1cc.

From the preceding table we obtain the following summary of the bacterial character of the Columbus hydrant water as delivered in the heart of the city.

BACTERIAL FINDINGS IN COLUMBUS WATER.

Month.	No. of days water was examined.	No. of bacteria per cc.	
		Max.	Min.
January.....	1	850	...
February.....	4	150,000	225
March.....	7	800	85
April.....	13	4,500	120
May.....	6	8,800	300
June.....	7	1,100	130
July.....	8	1,100	130
August.....	6	1,200	200
September.....	13	31,000	275
October.....	5	850	110
November.....	13	1,000	60
December.....	6	27,600	260

CHEMICAL EXAMINATION OF WATER FROM COLUMBUS.

(PUBLIC WATER SUPPLY.)

PARTS PER MILLION.

Sample number.	Date collected.	Color.	Turbidity.	Sediment.	Odor.	Nitrogen as			
						Albuminoid ammonia.	Free ammonia.	Nitrites.	Nitrates.
2712	Mar. 31	13	20	S	Earthy & ft. veget.	.082	.078	.005	2.8
2814	June 5	22	47.5	S	Earthy & veget.	.190	.032	tr	.8
2900	July 17	33	103.	Con	3 earthy.	.246	.014	.001	2.8
3066	Sept. 3	30	33.	S.	Earthy.	.199	.022	none	none
3108	Sept. 19	30	S.	S.	3 veget. & earthy.	.262	.063	.002	none
3230	Nov. 9	...	S.	Tr	None.	.142	.030	.012	tr
3421	Dec. 31	40	64	S.	4 veget.	.252	.114	.011	1.0

Sample number.	Oxygen required.	Chlorine.	Alkalinity.	Incrusting constituents.	Residue on evaporation.		Bacteria.	
					Total solids.	Loss on ignition.	No. per cc.	Intestinal present.
2712	1.97	12.7	255	195	719	...	90	= b-a
2814	5.78	5.3	210	585	585	...	1,100	= a
2900	6.31	4.6	178	81	471	...	550	- a & b
3066	4.85	7.9	183	109	509	150	650	= a & b
3108	12.47	9.9	177	137	561	145	31,000	= b-a
3230	2.56	15.8	276	102	627	...	230	- a & b
3421	8.79	9.8	216	106	478	146	22,000	= a

= Present. — Not present. a 1 cubic centimeter. b 50 cubic centimeters.

The chemical and bacterial results show a supply varying in quality from usable to seriously polluted with sewage. Colon bacilli were present in 19 out of 45 samples tested or 42.2 per cent.

WATER SUPPLY OF COLUMBUS STATE HOSPITAL.

The supply is derived from deep wells. See report on proposed water supply for Columbus State Hospital, Annual Report of State Board of Health for 1902. A request for examinations was made by the superintendent of the hospital because of the presence of some typhoid fever. Sample No. 2,682 represented the regular supply; No. 2,684, Scioto River water pumped for other than drinking purposes; No. 2,692 and No. 2,693, the regular supply from kitchen and pump house respectively at a later date; and No. 3,147, the water from the "second deepest well."

The results show the river water is badly polluted, the regular supply is potable, and the "second deepest well" carries much suspended matter.

EXAMINATIONS OF WATER FROM COLUMBUS STATE HOSPITAL.

PARTS PER MILLION.

Sample number.	Date collected.	Color.	Turbidity.	Sediment.	Odor.	Nitrogen as			
						Albuminoid ammonia.	Free ammonia.	Nitrites.	Nitrates.
2682	Feb. 13	5	none	none	none	.068	.014	none	6.6
2684	Feb. 13	50	175	decid'd	earthy	.366	.220	trace.	trace
2692	Feb. 27	5	none	none	none	.023	.003	trace	5.2
2693	Feb. 27	5	none	none	none	.024	.003	none	5.6
3147	Oct. 6	trace	220	dec'd	none	.099	.244	.003	none

Sample number.	Oxygen required.	Chlorine.	Alkalinity.	Residue on evaporation.		Bacteria.	
				Total.	Loss on ignition.	No. per cc.	Intestinal bacteria present in 50 c. c.
2682	.96	10.0	251	463	.....	190	yes
2684	10.92	1.7	109	404	.....	2300	yes
2692	.98	7.9	.....	474	.....	375	no
2693	.95	7.9	.....	.....	.....	350	no
3147	6.92	12.7	455	793	181	high	no

WATER SUPPLY OF CONTINENTAL.

The supply is derived from a drilled well. See Annual Report for 1898, page 483. No previous examination of the water had been made, and a sample was requested of the local board of health, but by accident the bottle intended for the chemical portion of the analysis was used for another water. Such findings as the quantity of water permitted to be made show a potable water.

EXAMINATION OF WATERS FROM CONTINENTAL.

PARTS PER MILLION.

Sample number.	Date collected.	Color.	Nitrogen as		Oxygen required.	Chlorine.	Bacteria.	
			Nitrites.	Nitrates.			No. per cc.	Intestinal present
2717	March 30, 1903	15	none	none	2.73	4.6	7	no

WATER SUPPLY OF DEFIANCE.

See special investigation elsewhere.

WATER SUPPLY OF EAST PALESTINE.

The supply was derived from drilled wells, but a large dug well was added. See Annual Report for 1901, page 442. A sample was requested

by the State Board of Health, as no analysis had been obtained previously. The results indicate a potable water.

EXAMINATION OF WATER FROM EAST PALESTINE.

PARTS PER MILLION.

Sample number.	Date collected.	Color.	Turbidity.	Sediment.	Odor.	Iron.	Nitrogen as	
							Nitrites.	Nitrates.
2714	March 30, 1903	9	slight	slight	?	.25	none	trace

Sample number.	Oxygen required.	Chlorine.	Alkalinity.	Total solids.	Bacteria.	
					No. per cc.	Intestinal present
2714	1.34	2.3	316	264	2500 a	no

a Obtained from a chemical, i. e., not sterilized bottle.

WATER SUPPLY OF EATON.

The supply is from drilled wells and springs, with an emergency connection to Seven Mile Creek. See Annual Report for 1898, page 590. Samples were requested by the State Board of Health as previous analyses had not been made. Sample No. 3,095 represented the hydrant water as delivered to consumers; No. 3,096 the well water at the waterworks; No. 3,097, spring water plus some well water, as it was impossible to obtain the spring water alone; and No. 3,098, water from Seven Mile Creek at the emergency intake. The samples show the water of the regular supply is potable, but the use of the emergency intake should be carefully avoided.

EXAMINATION OF WATERS FROM EATON.

PARTS PER MILLION.

Sample number.	Date collected.	Color.	Turbidity.	Sediment.	Odor.	Iron.	Nitrogen as			
							Albuminoid ammonia.	Free ammonia.	Nitrites.	Nitrates.
3095	1903. Sept. 14	10	none	none	none	.2	.064	.038	.002	1.8
3096	Sept. 14	8	none	none	very faint	.2	.080	.118	.007	trace
3097	Sept. 14	6	none	none	none	.2	.034	.040	.002	1.8
3098	Sept. 14	23	trace	slight	3 vegetative	.5	.220	.136	.004	1.5

Sample number.	Oxygen required.	Chlorine.	Alkalinity.	Incrusting constituents.	Total solids.	Bacteria.	
						No. per cc.	Intestinal present
3095	1.11	6.6	220	none	355	100	no
3096	1.28	10.8	287	none.	343	65	no.
3097	.60	4.1	263	none	344	700	no
3098	3.98	1.5	205	11	278	775	yes in 1 cc.

WATER SUPPLY OF ELMWOOD PLACE.

See Carthage.

WATER SUPPLY OF FOSTORIA.

The supply is obtained from Portage Creek by means of a diverting canal, the water flowing to reservoirs. See Annual Report of State Board of Health for 1898, page 529. A small filter is described in the reference quoted. Samples were obtained by the local board at the request of the State Board. No. 2,730 was taken from a reservoir before passing through the so-called filter, while No. 2,731 was from a hydrant having passed through the filter. The results are so nearly identical as to show there is no filtering action. The quality of the water at the time of sampling was not above reproach although most of the pollution was suspended soil or organic matter of vegetative origin.

EXAMINATION OF WATER FROM FOSTORIA.

PARTS PER MILLION.

Sample number.	Date collected.	Color.	Turbidity.	Sediment.	Odor.	Iron.	Nitrogen as			
							Albuminoid ammonia.	Free ammonia.	Nitrites.	Nitrates.
2730	April 7, '03	25	175	considerable	earthy	4.5	.328	.018	.001	trace
2731	April 7, '03	25	175	considerable	earthy	6.2	.304	.020	.001	1.0

Sample number.	Oxygen required.	Chlorine.	Alkalinity.	Incrusting constituents.	Total solids.	Bacteria.	
						No. per cc.	Intestinal present.
2730	9.80	trace	72	19	230	3000	yes
2731	9.15	trace	77	33	238	2800	yes

WATER SUPPLY OF FRANKLIN.

The supply is obtained from driven wells. There is an emergency intake leading to the canal. See Annual Report for 1900, page 551. No previous analysis had been made of this water and a sample was requested of the local health authorities. No. 3,056 represented the hydrant water and No. 3,057 the water at the emergency intake in the canal. The results show the hydrant water is potable, but that the emergency supply is so badly polluted that it should not be at all.

EXAMINATION OF WATERS FROM FRANKLIN.

PARTS PER MILLION.

Sample number.	Date collected.	Color.	Turbidity.	Sediment.	Odor.	Iron.	Nitrogen as			
							Albuminoid ammonia.	Free ammonia.	Nitrites.	Nitrates.
3056	Aug. 31	7	none	none	none	.2	.029	.008	none	3.2
3057	Aug. 31	19	16	slight	vegetative	.75	.180	.232	.040	.6

Sample number.	Oxygen required.	Chlorine.	Alkalinity.	Incrusting constituents.	Residue on evaporation.		Bacteria.	
					Total.	Loss on ignition.	No. per cc.	Intestinal present.
3056	2.19	6.6	241	22	382	89	120	no
3057	5.60	9.0	245	none	378	146	3600	yes

WATER SUPPLY OF FREMONT.

See special investigation elsewhere.

WATER SUPPLY OF GLENDALE.

The supply is derived from drilled wells. See Report for 1901, page 444. Previous analysis of this supply had not been made, and a sample was requested by the State Board of Health. The results showed a water quite cloudy from iron, but otherwise a suitable water for a public supply.

EXAMINATION OF WATER FROM GLENDALE.

PARTS PER MILLION.

Sample number.	Date collected.	Color.	Turbidity.	Sediment.	Odor.	Iron.	Nitrogen as			
							Albuminoid ammonia.	Free ammonia.	Nitrites.	Nitrates.
2718	March 31	44	98	considerable	earthy	6.5	.027	.182	none	trace

Sample number.	Oxygen required.	Chlorine.	Alkalinity.	Incrusting constituents.	Total solids.	Bacteria.	
						No. per cc.	Intestinal present.
2718	1.04	8.3	248	none	313	11	no

WATER SUPPLY OF GRANVILLE.

The supply is from driven wells. See Annual Report for 1899, page 699. As no previous examination of the water had been made a sample was requested by the State Board of Health. The analysis showed an excellent water in regard to freedom from organic pollution, but the water is open to some complaint on account of its hardness.

EXAMINATION OF WATER FROM GRANVILLE.

PARTS PER MILLION.

Sample number.	Date collected.	Color.	Turbidity.	Sediment.	Odor.	Iron.	Nitrogen as			
							Albuminoid ammonia.	Free ammonia.	Nitrites.	Nitrates.
2711	March 30 1903	10	none	none	none.	.1	.021	.009	trace	none

Sample number.	Oxygen required.	Chlorine.	Alkalinity.	Incrusting constituents.	Total residue on evaporation.	Bacteria.	
						No. per cc.	Intestinal present in 1 cc.
2711	.98	8.6	289	44	423	6	no

WATER SUPPLY OF HARRISON.

The supply is obtained from Whitewater River without treatment and from a series of driven wells. See Annual Report for 1898, page 581. No previous analyses of the water of this supply were at hand and request was made for samples by the State Board of Health. The results indicate that the supply is not above reproach at times, but at other times it is usable when the river water shows less pollution or is admitted in smaller proportion. Each of the following was taken from a hydrant.

EXAMINATION OF WATERS FROM HARRISON.

PARTS PER MILLION.

Sample number.	Date collected.	Color.	Turbidity.	Sediment.	Odor.	Iron.	Nitrogen as			
							Albuminoid ammonia.	Free ammonia.	Nitrites.	Nitrates.
2734	April 7	8	.....	.....	.....	..	.....	.....	none	none
2777	April 30	12	slight	slight	none	.5	.094	.009	trace	none
2895	July 14	18	slight	slight	faint	..	.....	.....	none	1.9

Sample number.	Oxygen required.	Alkalinity.	Incrusting constituents.	Chlorine.	Residue on evaporation.		Bacteria.	
					Total.	Loss on ignition.	No. per cc.	Intestinal present in 1 cc.
2734	3.32	.....	.....	1.6	.....	.....	1000	yes
2777	2.04	205	13	1.7	293	99	2300	yes
2895	2.97	.....	.....	1.8	.....	.....	550	no

WATER SUPPLY OF HARTWELL.

See Wyoming.

WATER SUPPLY OF KENT.

The supply is derived from a series of driven wells, supplemented in case of fire or other emergency from an impounding reservoir on Plum Creek. See Annual Report of Ohio State Board of Health for 1901. Previous analyses were wanting and samples were requested of the local board by the State Board of Health. The results show the regular supply from the wells is a good, safe, wholesome supply, relatively soft, but containing a little iron giving it a cloudy appearance which is of little moment. The Plum Creek water contains much organic matter and its use should be avoided unless imperative. No. 3,199 is creek water; No. 3,200 from wells, and No. 3,201 from a hydrant.

EXAMINATION OF WATERS FROM KENT.

PARTS PER MILLION.

Sample number.	Date collected.	Color.	Turbidity.	Sediment.	Odor.	Iron.	Nitrogen as			
							Albuminoid ammonia.	Free ammonia.	Nitrites.	Nitrates.
3199	1903. Oct. 21	40	v. slight	v. slight	none	.5	.170	.028	tr.	none
3200	Oct. 21	trace	v. slight	v. slight	none	.4	.028	.082	tr.	none
3201	Oct. 21	trace	v. slight	none	none	.2	.024	.024	tr.	none

Sample number.	Oxygen required.	Chlorine.	Alkalinity.	Incrusting constituents.	Residue on evaporation.		Bacteria.	
					Total.	Loss on ignition.	No. per cc.	Intestinal present in 1 cc.
3199	7.39	1.9	144	none	185	27	475	no
3200	.81	4.4	195	none	227	27	29	no
3201	.67	5.4	206	none	226	27	9	no

WATER SUPPLY OF KENTON.

The original supply was from a large basin supplied by subsoil water and in the bottom of the basin wells had been drilled. See Annual Report for 1898, page 567. In the fall of 1899 an addition was made to the supply from the Calhoun well (dug) south of the city. See Annual Report for 1899, page 113.

On account of the presence of a few cases of typhoid fever in the city, request was made by the local board of health for an examination of the water of the public supply. Sample No. 3,277 was from the Calhoun well, while No. 3,278 was a mixed sample from three faucets at houses where typhoid existed and therefore represented the city water

as delivered to consumers. The results show a water free from organic pollution, and it is a suitable water for a public supply.

EXAMINATION OF WATERS FROM KENTON.

PARTS PER MILLION.

Sample number.	Date collected.	Color.	Turbidity.	Sediment.	Odor.	Nitrogen as			
						Albuminoid ammonia.	Free ammonia.	Nitrites.	Nitrates.
3277	Nov. 29, 1903	15	.....	.....	.....	.....	.....	trace	none
3278	Nov. 29, 1903	none	v. slight	none	faint	.010	.014	trace	none

Sample number.	Oxygen required.	Chlorine.	Alkalinity.	Total solids.	Bacteria.	
					No. per cc.	Intestinal present in 1 cc.
3277	.38	.....	.....	.....	6	no
3278	.36	10.9	354	753	900 a	no

a. Count made from chemical (non-sterile) bottle.

WATER SUPPLY OF LAKESIDE.

See Annual Reports for 1898, page 103; for 1899, page 221; and for 1901, page 448. The supply is obtained from Lake Erie and treated by slow sand filtration. The area of the tanks allows the demand to exceed the supply at a slow rate at times. Lakeside was visited and a test made July 19-21 with the result that the findings showed an inefficient filtration at that time, and that, as then operated, the system was not a safeguard against a polluted water. A connection by which it was possible to introduce the raw water into the delivery pipe was in existence, but it is said this has since been removed.

EXAMINATION OF WATERS FROM LAKESIDE.

PARTS PER MILLION.

Sample number.	Date collected.	Color.	Turbidity.	Sediment.	Odor.	Iron.	Nitrogen as			
							Albuminoid ammonia.	Free ammonia.	Nitrites.	Nitrates.
2904	July 21	..	.....	.....	.....	...	.....	.....	none	none
2906	July 21	13	trace	trace	f. vegetative	.55	.093	.003	none	trace
2907	July 21	11	trace	none	none	.15	.050	.004	none	none

Sample number.	Oxygen required.	Chlorine.	Alkalinity.	Incrusting constituents.	Residue on evaporation.		Bacteria.	
					Total.	Loss on ignition.	No. per cc.	Intestinal present in 1 cc.
2904	2.61	7.9	.....	.....	.....	.....	425	no
2906	2.76	6.4	87	7	147	50	190	yes
2907	2.06	6.2	90	.....	143	49	100	no

Sample No 2,906 represented the unfiltered lake water as it reached the filters; Nos. 2,904 and 2,907 the filtered water taken from the public fountain, and a cottage near the hotel, respectively.

The bacterial examinations were as follows:

a. UNFILTERED WATER.

No. of Sample	Source	Date.	Hour	No. bacteria per c. c.
2909	Pipe filling the tanks.	July 19	2:20 p. m.	400
2910	Pipe filling the tanks.	July 19	2:22 p. m.	425
2911	One of the tanks.	July 19	2:24 p. m.	350
2916	Washroom at hotel.	July 19	4:15 p. m.	550
2918	Washroom at hotel.	July 20	10:30 p. m.	310
2920	Washroom at hotel.	July 21	6:10 a. m.	550
2906	Pipe filling the tanks.	July 21	8:45 a. m.	190
Average.				396

b. FILTERED WATER.

No. of Sample	Source.	Date.	Hour	No. Bacteria per c. c.
2914	Public drinking fountain.....	July 19	3:00 p. m.	550
2915	Hotel drinking fountain.....	July 19	4:05 p. m.	200
2917	Public drinking fountain.....	July 20	9:30 p. m.	630
2919	Hotel drinking fountain.....	July 20	10:35 p.m.	275
2904	Public drinking fountain.....	July 21	6:00 a. m.	425
2907	Fauset at Umstead cottage.....	July 21	9:15 a. m.	100
Average.....				363

The bacterial efficiency for the run was a little over 8 per cent.

WATER SUPPLY OF LEIPSIC.

The supply is from a series of drilled wells and was approved in 1900. See Report for 1900, page 89, also Report for 1901, page 450. An addition to the supply was proposed in 1903 and a sample of the present supply was examined at that time. The results show a potable water.

EXAMINATION OF WATER FROM LEIPSIC.

PARTS PER MILLION.

Sample number.	Date collected.	Color.	Turbidity.	Sediment.	Odor.	Iron.	Nitrogen as			
							Albuminoid ammonia.	Free ammonia.	Nitrites.	Nitrates.
3207	Oct. 26	trace	none	v. slight	faint	.9	.046	.110	trace	none

Sample number.	Oxygen required.	Chlorine.	Alkalinity.	Incrusting constituents.	Residue on evaporation.		Bacteria.	
					Total.	Loss on ignition.	No. per cc.	Intestinal present in 1 cc.
3207	1.11	30.3	165	92	670	42	170	No.

WATER SUPPLY OF LISBON.

See Annual Report of State Board of Health for 1898, page 532. The supply was derived from various sources, but chiefly from Beaver Creek. The sources of sewage pollution for this stream are given in the reference cited. No analytical evidence of the quality of the Lisbon supply being at hand, a request was made by the State Board of Health of the local board for a sample, and then it was learned a new supply had just been installed, the water being obtained from drilled wells. The analysis indicate all influence from surface water had not yet been removed from the system, but when such a condition is reached the water should be quite acceptable.

Sample No. 2,787 was taken from the waterworks wells, the other three from hydrants on various dates.

EXAMINATION OF WATERS FROM LISBON.

PARTS PER MILLION.

Sample number.	Date collected.	Color.	Turbidity.	Sediment.	Odor.	Iron.	Nitrogen as			
							Albuminoid ammonia.	Free ammonia.	Nitrites.	Nitrates.
2736	April 7 '03	24	slight	v.slight	none	.9	.004	.172	.006	none
2787	May 26 '03	21	slight	trace	musty?	.7	.063	.450	none	none
2788	May 26 '03	19	trace	trace	faint	...	.054	.244	.002	trace
3195	Oct. 20 '03	trace	v.slight	none	none	.08	.020	.006	.004	none

Sample number.	Oxygen required.	Chlorine.	Alkalinity.	Incrusting constituents.	Residue on evaporation.		Bacteria.	
					Total.	Loss on ignition.	No. per cc.	Intestinal present in 1 cc.
2736	1.31	27.3	193	none	435	.....	70	yes
2787	2.43	17.3	116	none	409	63	700 a	.....
2788	3.60	25.6	147	.....	.....	.....	200	yes
3195	1.05	59.7	268	36	484	61	65	no

a. Count made from a chemical (non-sterile) bottle.

WATER SUPPLY OF LOCKLAND.

See Wyoming.

WATER SUPPLY OF LORAIN.

The supply is derived from Lake Erie and passed through mechanical filters with the addition of a coagulant. Sulphate of alumina was used, then iron solutions, lime, etc. A sulphate of iron is now in use. The results have been varied. See Annual Reports for 1897, page 154; 1898, page 552; 1901, page 154. The lake water at this point shows more or less local pollution. For a time in the latter part of the summer the lake water was used without treatment while changes were being made in the filters.

A request was received from the local board of health for an examination and the August sample was analyzed. The results showed the water was not filtered properly at that date. The later samples were examined at the request of the waterworks department. It should be borne in mind that the bacterial examinations were made on shipped samples, and were not plated at the filtering station, therefore too much reliance should not be placed on them.

EXAMINATION OF WATER FROM LORAIN.

PARTS PER MILLION.

Sample number.	Date collected.	Color.	Turbidity.	Sediment.	Odor.	Iron.	Nitrogen as			
							Albuminoid ammonia.	Free ammonia.	Nitrites.	Nitrates.
3005	August 24	9	trace	trace	none	.5	.076	.016	none	none

Sample number.	Oxygen required.	Chlorine.	Alkalinity.	Incrusting constituents.	Total residue on evaporation.	Bacteria.	
						No. per cc.	Intestinal present in 1 cc.
3005	2.12	6.3	93	26	142	450	yes

BACTERIOLOGICAL EXAMINATIONS.

No. of Sample.	Source.	Date.	No. of bacteria per c. c.	Percentage of reduction.	Color present in 1 cc.
3148	Unfiltered.....	Oct. 5	600	....	yes
3149	Filtered.....	Oct. 5	47	92	yes
3150	Unfiltered.....	Oct. 6	250	....	yes
3151	Filtered.....	Oct. 6	120	52	no
3153	Unfiltered.....	Oct. 7	210	....	yes
3154	Filtered.....	Oct. 7	34	84	no
3156	Unfiltered.....	Oct. 8	800	....	yes
3157	Filtered.....	Oct. 8	19	97.6	no
3161	Unfiltered.....	Oct. 9	1300	....	yes
3162	Filtered.....	Oct. 9	270	79	no

TESTS FOR IRON.

UNFILTERED.

Nos. 3148 and 3150 combined .6 parts per million.

Nos. 3150 and 3153 combined .6 parts per million.

Nos. 3156 and 3161 combined 2.0 parts per million.

FILTERED.

Nos. 3149 and 3151 combined .3 parts per million.

Nos. 3154 alone .2 parts per million.

Nos. 3157 and 3162 combined .5 parts per million.

WATER SUPPLY OF MARION.

The supply is derived from drilled wells and a reservoir, the latter obtaining a subsoil water chiefly. See Annual Report for 1898, page 582. Previous analyses had not been made and samples were requested of the local board of health by the State Board. The results show a very satisfactory water as regards freedom from organic pollution, but the water is unusually hard and not desirable at all for boiler purposes. Sample No. 3,196 came from one of the wells; No. 3,197 from the reservoir; and No. 3,198 from the hydrant.

EXAMINATION OF WATER FROM MARION.

PARTS PER MILLION.

Sample number.	Date collected.	Color.	Turbidity.	Sediment.	Odor.	Iron.	Nitrogen as			
							Albuminoid ammonia.	Free ammonia.	Nitrites.	Nitrates.
3196	Oct.21	10	sl'ht	sl'ht	none	.1	.030	.148	.002	none
3197	Oct.21	10	sl'ht	very sl'ht	none	.09	.098	.014	trace	none
3198	Oct.21	10	very sl'ht	very sl'ht	none	.5	.046	.194	trace	none

Sample number.	Oxygen required.	Chlorine.	Alkalinity.	Incrusting constituents.	Residue on evaporation.		Bacteria.	
					Total.	Loss on ignition.	No. per cc.	Intestinal present in 1 cc.
3196	.64	3.9	393	231	855	218	none	no
3197	2.60	2.9	212	221	652	82	13	no
3198	1.29	2.9	377	224	848	95	10	no

WATER SUPPLY OF MARYSVILLE.

See special report.

WATER SUPPLY OF MASSILLON STATE HOSPITAL.

The supply is derived from bored wells. See Annual Report of State Board of Health for 1898, page 115. On account of the presence of typhoid fever at this institution, the superintendent requested an analysis of the water to be made. The number of bacteria appears to have been high by accident, otherwise the results indicate a potable water.

EXAMINATION OF WATER FROM MASSILLON STATE HOSPITAL.

PARTS PER MILLION.

Sample number.	Date collected.	Color.	Turbidity.	Sediment.	Odor.	Iron.	Nitrogen as .			
							Albuminoid ammonia.	Free ammonia.	Nitrites.	Nitrates.
2981	Aug 19	trace	none	none	pe'liar	.6	.032	.320	.002	none

Sample number.	Oxygen required.	Chlorine.	Alkalinity.	Incrusting constituents.	Total solids.	Bacteria.	
						No. per cc.	Intestinal present in 1 cc.
2981	.69	6.2	242	none	295	3,400	no

WATER SUPPLY OF MINGO JUNCTION.

See special report on an investigation of this supply in this volume.

WATER SUPPLY OF MONTPELIER.

The supply is from drilled wells. See Annual Report for 1898, page 485.

As no previous examination had been made of this water, a sample was requested of the local board of health. The examination showed a usable water with some minor undesirable findings. The water contained some iron and was not a wholly pleasing water in appearance. It has some alkalinity, but is free from scale forming material.

EXAMINATION OF WATER FROM MONTPELIER.

PARTS PER MILLION.

Sample number.	Date collected.	Color.	Turbidity.	Sediment.	Odor.	Iron.	Nitrogen as			
							Albuminoid ammonia.	Free ammonia.	Nitrites.	Nitrates.
2825	Jun 22	17	28	sl'ht	faint	1.5	.032	.228	.026	trace

Sample number.	Oxygen required.	Chlorine.	Alkalinity.	Incrusting constituents.	Total residue on evaporation.	Bacteria.	
						No. per cc.	Intestinal present in 1 cc.
2825	.98	17.4	281	none	409	20	no

WATER SUPPLY OF MT. VERNON.

The supply is derived from a series of driven wells, two dug wells being used for a receiving and a pumping well respectively. See Annual Report for 1899, page 702.

As no previous analysis was available, the State Board of Health requested a sample to be sent to the laboratory by the local board of health. The results show a good water except for the minor objection arising from the presence of a little iron, and that is of little moment when the water is otherwise so good.

EXAMINATION OF WATER FROM MT. VERNON.

PARTS PER MILLION.

Sample number.	Date collected.	Color.	Turbidity.	Sediment.	Odor.	Iron.	Nitrogen as			
							Albuminoid ammonia.	Free ammonia.	Nitrites.	Nitrates.
2823	Jun.22	12	trace	trace	faint	.5	.038	.208	trace	trace

Sample number.	Oxygen required.	Chlorine.	Alkalinity.	Incrusting constituents.	Residue on evaporation.		Bacteria.	
					Total	Loss on ignition.	No. per cc.	Intestinal present in 1 cc.
2823	.85	4.6	275	none	355	69	4	no

WATER SUPPLY OF NORTH BALTIMORE.

The supply is obtained from drilled wells. See Annual Report for 1901, page 455. No analysis had been made of this water and a sample was therefore desired by the State Board of Health. The results show a usable water as regards freedom from organic pollution, but it is a water undesirably high in inorganic matter for a public supply. There is, no doubt, much complaint on account of the mineral properties of the water and their effects. The water is one of the harder ones used as a public supply and contains a great deal of scale forming material.

EXAMINATION OF WATER FROM NORTH BALTIMORE.

PARTS PER MILLION.

Sample number.	Date collected.	Color.	Turbidity.	Sediment.	Odor.	Iron.	Nitrogen as			
							Albuminoid ammonia.	Free ammonia.	Nitrites.	Nitrates.
2827	Jun. 22	24	56	slight	oily	5.5	.092	.402	none	none

Sample number.	Oxygen required.	Chlorine.	Alkalinity.	Incrusting constituents.	Residue on evaporation.		Bacteria.	
					Total.	Loss on ignition.	No. per cc.	Intestinal present in 1 cc.
2827	2.23	176.8	205	377	1,463	369	110	no

WATER SUPPLY OF NORWOOD.

The supply is derived from drilled wells. See Annual Report for 1900, page 556.

No analysis had been made of this water and so a sample was requested by the State Board of Health. The results show one of the better ground water supplies of the state.

EXAMINATION OF WATER FROM NORWOOD.

PARTS PER MILLION.

Sample number.	Date collected.	Color.	Turbidity.	Sediment.	Odor.	Iron.	Nitrogen as			
							Albuminoid ammonia.	Free ammonia.	Nitrites.	Nitrates.
2826	Jun 22	8	none	none	none	.1	.011	.006	none	none

Sample number.	Oxygen required.	Chlorine.	Alkalinity.	Incrusting constituents.	Total residue on evaporation.	Bacteria.	
						No. per cc.	Intestinal present in 1 cc.
2826	.75	9.5	243	14	384	225	no

WATER SUPPLY OF OBERLIN.

The supply is derived from the east branch of Vermilion River and is passed through two reservoirs. See Annual Report for 1898, page 535. An analysis was desired by the State Board of Health and a sample was sent by the local board. Examination showed the presence of considerable organic matter, though chiefly vegetative in character. The water at the time of sampling was softer than that of most Ohio streams, but other information gained later indicates the water is part of the time much harder than it was at the time this sample was taken. This supply would be greatly improved by treatment, although usable in its present condition.

EXAMINATION OF WATER FROM OBERLIN.

PARTS PER MILLION.

Sample number.	Date collected.	Color.	Turbidity.	Sediment.	Odor.	Iron.	Nitrogen as			
							Albuminoid ammonia.	Free ammonia.	Nitrites.	Nitrates.
2732	Apr. 7.	32	slight	very slight	faint	.8	.196	.007	trace	none

Sample number.	Oxygen required.	Chlorine.	Alkalinity.	Incrusting constituents.	Total residue on evaporation.	Bacteria.	
						No. per cc.	Intestinal present in 1 cc.
2732	6.05	4.0	125	40	259	700	no

WATER SUPPLY OF ORRVILLE.

The supply is derived from drilled wells. See Annual Report for 1899. A sanitary analysis of the water was desired and the local board of health furnished a sample at the request of the State Board. The results show a very desirable water for drinking purposes owing to the freedom from organic pollution. The water is softer than most of our ground waters, and contains very little material to form a scale in boilers, therefore it is one of the better waters for steam uses.

EXAMINATION OF WATER FROM ORRVILLE.

PARTS PER MILLION.

Sample number.	Date collected.	Color.	Turbidity.	Sediment.	Odor.	Iron.	Nitrogen as			
							Albuminoid ammonia.	Free ammonia.	Nitrites.	Nitrates.
2834	Jun. 22	trace	none	none	none	0	.042	.264	none	none

Sample number.	Oxygen required.	Chlorine.	Alkalinity.	Incrusting constituents.	Residue on evaporation.		Bacteria.	
					Total	Loss on ignition.	No. per cc.	Intestinal present in 1 cc.
2834	.44	4.5	225	9	291	75	12	no

WATER SUPPLY OF OSBORN.

The supply is obtained from a series of driven wells. See Annual Report for 1900, page 556. No previous analysis had been made, and so a sample was requested by the State Board of Health. The results show a good water for domestic purposes although not a soft water, and its use should generally find favor with the citizens of that village.

EXAMINATION OF WATER FROM OSBORN.

PARTS PER MILLION.

Sample number.	Date collected.	Color.	Turbidity.	Sediment.	Odor.	Iron.	Nitrogen as			
							Albuminoid ammonia.	Free ammonia.	Nitrites.	Nitrates.
2828	Jun. 22	10	none	none	none	.2	.034	.026	none	none

Sample number.	Oxygen required.	Chlorine.	Alkalinity.	Incrusting constituents.	Total residue on evaporation.	Bacteria.	
						No. per cc.	Intestinal present in 1 cc.
2828	.60	2.4	211	27	330	70	No

WATER SUPPLY OF PERRYSVILLE.

The supply is obtained from a drilled well and pumped to a reservoir. See Annual Report for 1899, page 704. No previous analysis of the water had been made, and a sample was requested by the State Board of Health. The results indicated a usable water, although there was some effect on part of the findings because of the passing through the reservoir.

EXAMINATION OF WATER FROM PERRYSVILLE.

PARTS PER MILLION.

Sample number.	Date collected.	Color.	Turbidity.	Sediment.	Odor.	Iron.	Nitrogen as			
							Albuminoid ammonia.	Free ammonia.	Nitrites.	Nitrates.
2829	Jun. 22	10	none	none	none	.1	.042	.320	.070	none

Sample number.	Oxygen required.	Chlorine.	Alkalinity.	Incrusting constituents.	Total residue on evaporation.	Bacteria.	
						No. per cc.	Intestinal present in 1 cc.
2829	.86	32.3	213	none	309	500	No

WATER SUPPLY OF PIEDMONT.

The supply is obtained from springs. See Annual Report for 1899, page 705. No previous analysis of this water had been made and the State Board of Health requested a sample to be sent in by the local board. The results show a pure soft water that would be gladly welcomed in many a larger community.

EXAMINATION OF WATER FROM PIEDMONT.

PARTS PER MILLION.

Sample number.	Date collected.	Color.	Turbidity.	Sediment.	Odor.	Iron.	Nitrogen as			
							Albuminoid ammonia.	Free ammonia.	Nitrites.	Nitrates.
2830	Jun 23	8	trace	trace	faint	.2?	.062	.028	none	.5

Sample number.	Oxygen required.	Chlorine.	Alkalinity.	Incrusting constituents.	Total residue on evaporation.	Bacteria.	
						No. per cc.	Intestinal present in 1 cc.
2830	.60	trace	37	4	45	120	No

WATER SUPPLY OF PLAIN CITY.

The supply is derived from drilled wells. See Annual Report for 1901, page 456. A mineral analysis of this water was made by Prof. N. W. Lord for the State Board of Health. See Examination of Sources of Public Water Supplies, 1898, page 206. A sample was requested of the local board of health by the State Board in June 1903. The results show a desirable water as regards freedom from organic pollution, but the water is hard and objectionable for steam uses.

EXAMINATION OF WATER FROM PLAIN CITY.

PARTS PER MILLION.

Sample number.	Date collected.	Color.	Turbidity.	Sediment.	Odor.	Iron.	Nitrogen as			
							Albuminoid ammonia.	Free ammonia.	Nitrites.	Nitrates.
2832	Jun. 23	9	trace	none	none	.1	.016	.142	.004	none

Sample number.	Oxygen required.	Chlorine.	Alkalinity.	Incrusting constituents.	Residue on evaporation.		Bacteria.	
					Total.	Loss on ignition.	No. per cc.	Intestinal present in 1 cc.
2831	1.18	14.6	282	176	748	170	17	No

WATER SUPPLY OF PORT CLINTON.

See report on special investigation of this supply in this volume.

WATER SUPPLY OF READING.

The supply is obtained from drilled wells. See Annual Report for 1901, page 458. No previous analysis of the water had been made and a sample was requested by the State Board of Health. The results show that this water is as yet free from surface pollutions and a suitable water for domestic uses. It is not a soft water, but fortunately it contains but little of those substances forming a hard scale in boilers.

EXAMINATION OF WATER FROM READING.

PARTS PER MILLION.

Sample number.	Date collected.	Color.	Turbidity.	Sediment.	Odor.	Iron.	Nitrogen as			
							Albuminoid ammonia.	Free ammonia.	Nitrites.	Nitrates.
2832	June 23	9	trace	none	none	.1	.016	.142	.004	none

Sample number.	Oxygen required.	Chlorine.	Alkalinity.	Incrusting constituents.	Total residue on evaporation.	Bacteria.	
						No. per cc.	Intestinal present in 1 cc.
2832	.64	17.8	279	20	355	18	no

WATER SUPPLY OF ROCKFORD.

The supply is derived from drilled wells. See Annual Report of State Board of Health for 1901, page 459. No previous examination of this water having been made, a sample was requested of the local board of health by the State Board. The results show a usable water as regards freedom from organic pollution, but the inorganic contents may be objectionable to some users, and in addition the water is too hard for commercial purposes. The scale forming material in this water would prevent its use for steam purposes.

EXAMINATION OF WATER FROM ROCKFORD.

PARTS PER MILLION.

Sample number.	Date collected.	Color.	Turbidity.	Sediment.	Odor.	Iron.	Nitrogen as			
							Albuminoid ammonia.	Free ammonia.	Nitrites.	Nitrates.
2833	Jun. 23	11	16	trace	faint	.1 ?	.057	.410	.009	none

Sample number.	Oxygen required.	Chlorine.	Alkalinity.	Incrusting constituents.	Residue on evaporation.		Bacteria.	
					Total	Loss on ignition.	No. per cc.	Intestinal present in 1 cc.
2833	.81	11.5	161	476	1,370	282	700	no

WATER SUPPLY OF SANDUSKY.

See report on special investigation in this volume.

WATER SUPPLY OF SPRINGFIELD.

The supply was obtained from a well, filter gallery, filter basin, and Buck Creek. See Annual Report for 1900, pages 101 and 558.

In 1903 an addition was made to secure more water from the gravel beds near the waterworks. See elsewhere in this volume the report on proposed additional water supply of Springfield.

To help out the new addition, water from Buck Creek was run upon the land drained by the filter galleries, and chemical samples of Buck Creek and the subsoil water were requested by the State Board of Health. The samples were collected by Mr. W. H. Sieverling, engineer. No. 3,319 represents the filtered water and No. 3,320 the creek water. The percentage of removal of organic matter is not large as measured by the findings for oxygen required and albuminoid ammonia, but, it should be remembered that the creek water was low in these, and much lower than usual as indicated by a comparison with the findings obtained for that stream in 1900. See Annual Report for 1900, page 426. The mineral findings indicate that not all of the first sample was derived from the creek—some being subsoil water, but it is a potable water at present.

EXAMINATION OF WATERS FROM SPRINGFIELD.

PARTS PER MILLION.

Sample number.	Date collected.	Color.	Turbidity.	Sediment.	Odor.	Iron.	Nitrogen as			
							Albuminoid ammonia.	Free ammonia.	Nitrites.	Nitrates.
3319	Dec.3	none	none	trace	none	.2	.048	.012	trace	2
3320	Dec.3	none	very slight	sl'ht	none	.1	.096	.016	.002	2

Sample number.	Oxygen required.	Chlorine.	Alkalinity.	Incrusting constituents.	Residue on evaporation.	
					Total.	Loss on ignition.
3319	.20	3.0	311	none	390	99
3320	.75	1.9	321	31	402	106

WATER SUPPLY OF ST. BERNARD.

The supply is derived from drilled wells. See Annual Report for 1901, page 460. Previous analysis of the water had not been made by

the State Board of Health, and a sample was requested of the local board of health. The results show a suitable water for domestic uses, but it is hard. Comparison with the analysis by Dickore and Morgan in 1894, (see Report for 1895, page 86) shows the water has improved as regards freedom from organic matter.

Bond Hill is also supplied with water from this source.

EXAMINATION OF WATER FROM ST. BERNARD.

PARTS PER MILLION.

Sample number.	Date collected.	Color.	Turbidity.	Sediment.	Odor.	Iron.	Nitrogen as			
							Albuminoid ammonia.	Free ammonia.	Nitrites.	Nitrates.
2837	Jun. 24	8	none	none	very faint	0	.019	.074	.007	1.6

Sample number.	Oxygen required.	Chlorine.	Alkalinity.	Incrusting constituents.	Residue on evaporation.		Intestinal bacteria present in 1 cc.
					Total.	Loss on ignition.	
2837	.75	12.2	277	47	474	92	no

WATER SUPPLY OF ST. MARY'S.

The supply is derived from a series of drilled flowing wells. See Annual Report for 1898, page 486. The State Board of Health requested a sample from the public supply. The results show a water that is comparatively free from organic matter and on that account a good drinking water. The sample was hard, but the amount of scale forming material in it was low. The sample indicates a potable water, but not a soft water.

EXAMINATION OF WATER FROM ST. MARY'S.

PARTS PER MILLION.

Sample number.	Date collected.	Color.	Turbidity.	Sediment.	Odor.	Iron.	Nitrogen as			
							Albuminoid ammonia.	Free ammonia.	Nitrites.	Nitrates.
2940	Aug. 3	6	trace	none	none	.5	.032	.003	none	trace

Sample number.	Oxygen required.	Chlorine.	Alkalinity.	Incrusting constituents.	Total solids.	Bacteria.	
						No. per cc.	Intestinal present in 1 cc.
2940	.87	7.3	284	32	576	85	no

WATER SUPPLY OF TIFFIN.

See report on special investigation of this supply in this volume.

WATER SUPPLY OF TROTWOOD.

The supply is obtained from two driven wells. See Annual Report for 1900, page 559. No previous analysis had been made and a sample was requested by the State Board of Health. The results show a usable water, although one or two findings are not desirable.

EXAMINATION OF WATER FROM TROTWOOD.

PARTS PER MILLION.

Sample number.	Date collected.	Color.	Turbidity.	Sediment.	Odor.	Iron.	Nitrogen as			
							Albuminoid ammonia.	Free ammonia.	Nitrites.	Nitrates.
2941	Aug. 3	11	none	none	none	.2	.012	.008	none	10.8

Sample number.	Oxygen required.	Chlorine.	Alkalinity.	Incrusting constituents.	Total residue on evaporation.	Bacteria.	
						No. per cc.	Intestinal present in 1 cc.
2941	.45	1.7	290	55	445	300	no

WATER SUPPLY OF UNION CITY.

The supply is derived from the Indiana side of the village and comes from dug wells supplemented by drilled wells. See Annual Report for 1901, page 462. A sample was requested by the State Board of Health as previous analysis of the water had not been made. The chemical portion of the first sample was lost in transit and a second sample was then requested. The results indicate a usable water with some undesirable findings. No. 2,945 was a hydrant sample and No. 3,051 was from a public fountain.

EXAMINATION OF WATER FROM UNION CITY.

PARTS PER MILLION.

Sample number.	Date collected.	Color.	Turbidity.	Sediment.	Odor.	Iron.	Nitrogen as			
							Albuminoid ammonia.	Free ammonia.	Nitrites.	Nitrates.
2945	Aug. 3	.....	.....	.....	.....	.....	.....	.....	.....	.....
3051	Aug 27	10	trace	trace	faint	.7	.032	.116	.028 ?	.4

Sample number.	Oxygen required.	Chlorine.	Alkalinity.	Incrusting constituents.	Residue on evaporation.		Bacteria.	
					Total.	Loss on ignition.	No. per cc.	Intestinal present in 1 cc.
2945	.....	2.6	.....	.....	.....	.....	750	no
3051	1.10	2.6	334	none	372	116	11,000	no

WATER SUPPLY OF UPPER SANDUSKY.

The supply is derived from Sandusky River with the addition of some ground water which enters the pump well. At times the river water is passed through a "filter box." See Annual Report for 1898, page 439. The local board of health requested the analysis to ascertain the amount of filtration accomplished and the quality of the water. The results might be taken as indicating the filtered sample was obtained from the river at a different stage than the unfiltered sample. There was a faulty filtration at best and probably very little. The hydrant water was usable, but quite undesirable, owing to its appearance, hardness, iron, organic matter and the presence sparingly of intestinal bacteria. Colon bacilli were found when 50 cubic centimeters of water were tested. Sample No. 2,880 was obtained from the river, and No. 2,881 was from a hydrant.

EXAMINATION OF WATER FROM UPPER SANDUSKY.

PARTS PER MILLION.

Sample number.	Date collected.	Color.	Turbidity.	Sediment.	Odor.	Iron.	Nitrogen as			
							Albuminoid ammoni.	Free ammonia	Nitrites.	Nitrates.
2880	Jul.7	28	43	dis'ct	4 ea.	1.2	.400	.090	.002	none
2881	Jul.7	25	123	dis'ct	2 ea.	3.5	.286	.008	trace.	trace

Sample number.	Oxygen required.	Chlorine.	Alkalinity.	Incrusting constituents.	Total solids.	Bacteria.	
						No. per cc.	Intestinal present in 1 cc.
2880	7.06	5.1	160	106	486	1,900	yes
2881	10.00	5.8	177	181	727	160	no

WATER SUPPLY OF URBANA.

The supply is derived from a large dug well. See Annual Report for 1899, page 132. An analysis was requested by the local board of health

in August and again in December on account of the presence of typhoid fever in the city. Samples No. 2,957 and No. 3,365 were from hydrants, and No. 2,956 from the reservoir that is filled from the dug well. The results indicate a potable water that was not the cause of the typhoid present in the city. The August samples show an increase in chlorides and nitrates over samples taken at the same season of the year in 1901 (see Report for 1901, page 191), and would indicate the influence of remote pollution is coming closer to the well.

EXAMINATION OF WATERS FROM URBANA.

PARTS PER MILLION.

Sample number.	Date collected.	Color.	Turbidity.	Sediment.	Odor.	Nitrogen as			
						Albuminoid ammonia.	Free ammonia.	Nitrites.	Nitrates.
2956	Aug. 10	trace	none	none	none	.050	.022	.035	8.4
2957	Aug. 10	7	none	none	none	.058	.012	none	9.0
3365	Dec. 23	trace	none	trace	none	.032	.002	trace	5.0

Sample number.	Oxygen required.	Chlorine.	Alkalinity.	Total solids.	Bacteria.	
					No. per cc.	Intestinal present in 1 cc.
2956	.95	10.7	267	441	850	no
2957	1.31	10.4	286	504	27	no
3365	.45	5.6	344	377	15	no

WATER SUPPLY OF WASHINGTON C. H.

The supply is obtained from dug and drilled wells in the low lands along Paint Creek. See Annual Report for 1901, page 462. As no previous analysis had been made a sample was requested by the State Board of Health. The results show a suitable water for a public supply, but it is hard.

EXAMINATION OF WATER FROM WASHINGTON C. H.

PARTS PER MILLION.

Sample number.	Date collected.	Color.	Turbidity	Sediment.	Odor.	Iron.	Nitrogen as			
							Albuminoid ammonia.	Free ammonia.	Nitrites.	Nitrates.
2942	Aug.3	10	trace	trace	faint	.3	.060	.003	.002	trace

Sample number.	Oxygen required.	Chlorine.	Alkalinity.	Incrusting constituents.	Total solids.	Bacteria.	
						No. per cc.	Intestinal present in 1 cc.
2942	1.25	1.6	290	52	413	75	no

WATER SUPPLY OF WELLSTON.

The supply is derived from Little Raccoon Creek. See Annual Report for 1898, page 541. As no previous examination had been made, a sample was requested by the State Board of Health. The sample was from a public fountain. The determinations are subject to such wide variations in a surface supply, and as we have but the one sample as yet, it is not known whether this fairly represents the quality of the water. At the time of sampling, this water was not bad for a surface supply, although it is open to some objection. It is a soft water relatively, but is not free from scale forming material nor turbidity. Intestinal bacteria were present when 50 cubic centimeters of the water were used for the test. The analysis shows a usable water.

EXAMINATION OF WATER FROM WELLSTON.

PARTS PER MILLION.

Sample number.	Date collected.	Color.	Turbidity.	Sediment.	Odor.	Iron.	Nitrogen as			
							Albuminoid ammonia.	Free ammonia.	Nitrites.	Nitrates.
2733	Apr.7.	22	98	sl'ht	ea'thy	1.5	.096	.010	none	none

Sample number.	Oxygen required.	Chlorine.	Alkalinity.	Incrusting constituents.	Total solids.	Bacteria.	
						No. per cc.	Intestinal present in 1 cc.
2733	2.49	.4	20	42	137	1,300	no

WATER SUPPLY OF WEST CARROLLTON.

The supply is derived from two drilled wells. See Annual Report for 1900, page 562. As no previous analysis had been made of this water, a sample was requested by the State Board of Health. The results indicate a suitable water at present for a public supply, but it is a hard water.

EXAMINATION OF WATER FROM WEST CARROLLTON.

PARTS PER MILLION.

Sample number.	Date collected.	Color.	Turbidity.	Sediment.	Odor.	Iron.	Nitrogen as			
							Albuminoid ammonia.	Free ammonia.	Nitrites.	Nitrates.
2938	Aug.3	7	none	none	none	.1	.021	.006	.002	1.8

Sample number.	Oxygen required.	Alkalinity.	Chlorine.	Incrusting constituents.	Total solids.	Bacteria.	
						No. per cc.	Intestinal present in 1 cc.
2938	.36	3.3	241	66	347	140	no

WATER SUPPLY OF WILLOUGHBY.

The supply is obtained from an infiltration well in a gravel bed near Chagrin River. See Annual Report for 1898, page 560. As no previous analysis had been made of this water, a sample was requested by the State Board of Health. The results indicate the water is being properly filtered by the natural process, and that it is a good potable water, softer than most Ohio waters, although not a soft water.

EXAMINATION OF WATER FROM WILLOUGHBY.

PARTS PER MILLION.

Sample number.	Date collected.	Color.	Turbidity.	Sediment.	Odor.	Iron.	Nitrogen as			
							Albuminoid ammonia.	Free ammonia.	Nitrites.	Nitrates.
2944	Aug. 3	5	none	none	none	.15	.016	.012	none	none

Sample number.	Oxygen required.	Chlorine.	Alkalinity.	Incrusting constituents.	Total solids.	Bacteria.	
						No. per cc.	Intestinal present in 1 cc.
2944	1.14	1.7	140	41	225	100	no

WATER SUPPLY OF WYOMING.

Arlington Heights, Hartwell and Lockland also derive water from this supply. The source of supply is a series of drilled wells. See Annual Report for 1901, page 464. As no previous analysis had been made of this water, a sample was requested by the State Board of Health, and subsequently other samples were desired. The hydrant samples are Nos. 2,943, 3,060 and 3,103; Nos. 3,058 and 3,100 are waterworks wells samples; Nos. 3,059 and 3,101 are from the reservoir to which the water is pumped; and No. 3,102 was taken from a public fountain. The results show that the wells yield a desirable water for a public supply although not a soft water. This water, however, contains very little scale forming material, which makes the water a more desirable one for steam purposes than it would otherwise be.

EXAMINATION OF WATERS FROM WYOMING.

PARTS PER MILLION.

Sample number.	Date collected.	Color.	Turbidity.	Sediment.	Odor.	Iron.	Nitrogen as			
							Albuminoid ammonia.	Free ammonia.	Nitrites.	Nitrates.
2943	Aug.3	13	16	trace	faint	1.1	.030	.168	.024	none

Sample number.	Oxygen required.	Chlorine.	Alkalinity.	Incrusting constituents.	Total solids.	Bacteria.	
						No. per cc.	Intestinal present in 1 cc.
2943	.53	5.3	267	7	336	325	no

Sample number.	Date collected.	Chlorine.	Nitrogen as		Bacteria.	
			Nitrites.	Nitrates.	No. per cc.	Intestinal present in 1 cc.
3058	Aug. 31.....	5.8	trace	none	10	no
3059	Aug. 31.....	5.2	none	none	300	no
3060	Aug. 31.....	5.3	.012	none	38	no
3100	Sept. 16.....	5.9	none	none	5	no
3101	Sept. 16.....	5.9	none	none	70	no
3102	Sept. 16.....	6.0	.032	none	.....	no
3103	Sept. 16.....	6.0	.010	none	24	no

WATER SUPPLY OF ZANESVILLE.

See report on special investigations of this supply in this volume.

EXAMINATIONS OF MISCELLANEOUS WATERS

PARTS PER

Sample number.	Place.	Date collected.		Source of sample.	Cause for examination.	Color.	Turbidity.	Sediment.	Odor.
		Month.	Day.						
2699	Akron	3	12	Dug well....	Typhoid.....	10	.....	trace	whiskey
2858	Bellaire	7	6	Drilled well.	Diarrhoea....	tr	none	none	very ft. oily
2923	Bellaire	7	22	Drilled well.	Quality.....	18	tr	tr	ft. peculiar
3342	Bellaire	12	7	Drilled well.	Diarrhoea....	none	8	V. S.	none
2724	Bellevue	4	2	Cistern.....	Typhoid.....	tr	tr	tr	stale
2725	Bellevue	4	2	Cistern-well.	Typhoid.....	80	15	S.	stale and veg.
2750	Belmont Co., Goshen Tp.	4	15	Drilled well.	Typhoid.....	65	S.	distinct	sour & swampy
2739	Butler Co., Lemon Tp.	4	9	D'g-driv well	Typhoid.....	13	V. S.	none	faint
3109	Same	4	16	.....	.....	30	S.	S.	5 oily
3128	Butler Co., Oxford Tp.	9	23	Dug well....	Quality.....	none	V. S.	V. S.	earthy
2661	Bluffton	1	5	Drilled well.	Typhoid.....	15	V. S.	V. S.	none
2662	Bluffton	1	5	Drilled well.	Typhoid.....	5	none	none	none
2709	Bryan	3	30	Dug well....	Typhoid.....	20	V. S.	con	ft. earthy
3106	Cambridge	9	17	.....	.....	17	S.	S.	none
2769	Canal Winchester.	4	29	Driven well.	Quality.....	21	60	tr	none
2770	Canal Winchester.	4	29	Dug well....	Quality.....	18	mere tr	tr	none
2752	Carey	4	18	.....	.....	.....	.....	.....	.....
2882	Carroll Co., Monroe Tp.	7	7	.....	.....	17	tr	tr	none
2883	Same	7	7	.....	.....	8	none	none	none
2953	Circleville	8	8	Spring	Quality.....	20	16	tr	ft. veg.
2954	Circleville	8	8	Dug well....	Typhoid.....	18	tr	mere tr	faint
2675	Collinwood	1	31	Dug well....	Typhoid.....	.....	.....	.....	.....
2821	Columbus	6	15	Driven well.	Quality.....	tr	none	mere tr	none
3094	Columbus	9	14	Filter .....	.....	.....	.....	.....	.....
3190	Columbus Busy Bee	10	20	Drilled well.	Quality.....	.....	.....	.....	.....
3356	Columbiana Co., Elk Run Tp.	12	15	Dug well....	Typhoid.....	none	none	tr	s. woody
2716	Continental	3	30	Drilled well.	Quality.....	13	s. trace	S.	none
3065	Corning	9	2	Dug well....	Typhoid.....	17	S.	S.	ft. earthy
3202	Coshocton Co., Tiverton Tp.	10	22	Spring	Typhoid.....	tr	none	none	none
3237	Covington	10	10	Dug well....	.....	15	43	S.	faint
2690	Crawford Co., Holmes Tp.	2	17	Dug well....	Bowel trouble	7	none	none	none
3068	Dalzell	8	5	.....	.....	10	.....	.....	.....
2006	Danville	8	24	Spring	School	7	none	none	none
3713	East Palestine ..	3	30	Dug well....	Quality.....	7	.....	.....	.....
3115	Fairfield Co., Richmond Tp.	9	21	Dug well....	Typhoid.....	10	S.	S.	musty
2671	Fostoria	1	26	Drilled well.	Typhoid.....	15	tr	tr	none
2779	Fostoria	5	4	Drilled well.	Quality.....	13	31	S.	1 oily
2884	Fostoria	7	8	Drilled well.	Quality.....	10	tr	tr	none
2936	Fostoria	7	30	Drilled well.	Typhoid.....	8	16	S.	faint oily
3261	Fostoria	11	18	Dug well....	Quality.....	tr	V. S.	V. S.	ft. woody
2697	Franklin Co., Truro Tp.	3	12	Dug well....	Typhoid.....	17	24	S.	sl. earthy
2698	Same	3	12	Driven well.	Quality.....	11	60	con	sl. earthy
2767	Galena	4	27	Dug well....	Typhoid.....	10	tr	tr	trace
2678	Galion	2	4	Dug well....	Typhoid.....	11	none	tr	faint
2670	Girard	1	22	Drilled well.	Typhoid.....	tr	none	none	none
3024	Girard	7	26	Dug well....	Typhoid.....	8	S.	mere tr	peculiar (veg.)
3192	Girard	10	19	Dug well....	Typhoid.....	tr	none	tr	none
3349	Girard	12	15	Drilled well.	Quality.....	none	none	V. S.	ft. woody
3350	Girard	12	15	Dug well....	Typhoid.....	none	none	V. S.	none
3076	Granville	9	8	Bored well..	School	8	trace	trace	none
2676	Greentown	2	2	Dug well....	Quality.....	10	none	none	whiskey
2677	Greentown	2	2	Dug well....	Typhoid.....	10	tr	tr	ft. whiskey
3182	Grover Hill	10	14	Dug well....	Typhoid.....	18	60	dec.	ft. earthy
3183	Grover Hill	10	14	Dug well....	Typhoid.....	5	none	tr	tr
3119	Hamilton Co., Sycamore Tp.	9	22	Artesian well	School	10	none	none	none
3120	Same	9	22	Driven well.	School	10	60	S.	oily
3121	Same	9	22	Cistern	School	35	none	none	none
3122	Same	9	22	Dug well....	School	none	V. S.	V. S.	none
3123	Same	9	22	Cistern	School	10	V. S.	V. S.	none
3137	Same	10	1	Cistern	School	30	V. S.	S.	woody

* Date received. † 1223.5.

FROM PRIVATE SUPPLIES AND SPECIAL SOURCES.

MILLION.

Oxygen required.	Nitrogen as				Chlorine.	Alkalinity.	Total solids.	Colon present in 1 cc.	Bacteria per cc.	Remarks.
	Albuminoid ammonia.	Free ammonia.	Nitrites.	Nitrates.						
7.11	.094	.007	.014	24.0	43.8	72	739	in 1cc	40300	Condemned.
.92	.032	.008	none	9.0	42.8	216	865	no	.....	Usable.
4.55	.110	.588	none	none	†	446	2688	no	1100	Mineral character
.82	.066	.078	.060	15.0	76.5	393	1280	no	1800	Not potable.
1.50	.068	.014	.014	46.2	44.0	53	388	no	700	Condemned.
10.81	.458	1.500	.120	46.0	58.5	165	817	no	700	Condemned.
5.82	.200	.062	.004	11.2	32.3	91	300	in 1cc	4900	Condemned.
1.30	.044	.114	none	3.2	6.8	230	363	no	120	[roundings. Advised abandoning.
21.44	1.036	1.120	none	none	164.1	145	.....	in 1cc	106000	Polluted. Condemned. Bad sur-
1.72	.070	.008	.020	8.0	54.3	277	593	no	1900	Advised abandoning.
2.47	.154	.062	.016	20.0	94.2	338	927	in 50 cc	8500	Polluted. Close.
1.22	.068	.034	.002	3.20	67.6	334	780	no	1000	Usable.
1.57	.044	.464	.001	none	8.6	294	401	.....	.....	Advised abandoning.
5.27	.054	.028	.010	14.0	65.9	221	.....	in 50cc	1100	Polluted.
3.35	.054	.094	none	none	1.5	254	375	.....	.....	Usable.
5.21	.063	.003	none	35.2	91.5	301	865	.....	.....	Too much pollution.
.....	.....	.....	.....	.....	tr	.....	.....	no	100	Usable.
1.47	.040	.016	.004	4.0	23.5	38	216	in 1cc	1100	Advised abandoning.
.58	.028	.010	none	2.8	3.1	27	90	in 50 cc	800	Usable. Protect.
3.83	.142	.052	none	none	4.3	280	427	in 1cc	6500	Protect from animals.
3.28	.142	.050	.080	24.0	58.8	344	771	in 1cc	1300	Polluted. Condemned.
.....	.....	.....	none	.....	low	.....	.....	in 1cc	700000	Advised closing.
1.17	.052	.038	.030	15.5	39.2	248	1041	in 50 cc	350	Advised abandoning.
.....	.....	.....	none	.....	.....	.....	.....	in 1cc	50000	Not sterile.
.....	.....	.....	none	.....	25.9	.....	.....	no	3	Usable.
1.38	.040	.058	.024	2.8	38.6	94	225	no	6100	Abandon or protect.
8.01	.066	.346	none	none	14.8	124	1108	.....	.....	Usable.
6.22	.210	.042	.004	none	88.8	94	430	in 1cc	7200	Polluted.
.66	.032	.010	none	.8	1.5	58	.....	no	220	Usable.
.78	.062	.032	tr	16.0	20.6	318	335	no	350	Past pollution high.
2.30	.060	.003	tr	86.4	143.2	259	1023	in 50 cc	1000	Advised closing.
.....	.....	.....	1.250	15.6	66.2	.....	.....	in 1cc	12000	Polluted. Close.
.72	.028	.034	.002	8.0	4.9	193	315	no	15	Usable.
1.70	.....	.....	.003	28.0	38.0	.....	.....	no	50	Doubtful quality.
1.78	.122	.020	.003	none	34.5	478	981	no	650	Usable.
1.58	.118	.540	.002	none	17.4	184	1415	in 1cc	1100	Advised abandoning.
2.51	.116	.444	none	none	16.3	179	1445	no	375	Undesirable inorganically
2.07	.086	.030	none	20.0	66.9	325	991	no	70	Advised abandoning.
1.10	.043	.520	.006	none	15.1	151	1460	no	140	Not cause typhoid.
1.98	.054	.062	tr	tr	67.6	447	1113	no	1100	Usable.
6.10	.132	.010	tr	18.4	15.3	234	604	no	2400	Condemned. Closed.
2.54	.026	.028	none	none	.9	249	383	no	58	Usable.
3.86	.061	.050	.120	9.6	29.7	357	2231	in 1cc	950	Polluted. Close.
2.00	.072	.013	.080	2.9	26.2	250	704	in 1cc	2000	Should be closed.
.55	.030	.016	none	none	44.2	218	585	no	100	Usable.
1.36	.036	.003	none	16.0	55.9	240	1301	in 1cc	7300	Polluted.
1.42	.058	.004	.024	4.0	157.0	282	1803	no	2200	Polluted. Advised abandoning.
.28	.018	.384	.004	none	32.2	264	378	no	8	Usable.
.30	.024	.002	none	12.0	87.2	254	669	no	160	Past pollution great.
.72	.050	.036	.001	1.8	3.1	269	367	no	100	Potable.
3.59	.144	.056	.002	16.0	71.0	217	.....	no	5100	Advised abandoning.
6.88	.222	.060	.032	4.4	35.0	245	.....	in 40 cc	15500	Unsafe.
1.69	.116	.252	tr	none	17.6	459	2160	no	2500	Undesirable.
3.07	.054	.074	.002	3.2	15.7	346	1702	no	190	Undesirable.
.75	.022	.012	none	2.60	35.1	267	590	no	137000	Usable.
1.15	.064	.232	.024	tr	20.6	227	342	no	460000	Suspicious.
4.96	.086	.032	.080	tr	.....	42	80	no	.....	Usable.
.68	.044	.012	.002	2.0	47.5	364	763	no	.....	Usable.
1.44	.032	.018	none	none	11.3	239	291	no	.....	Chlorine high for cistern.
6.49	.356	.050	.012	none	7.3	67	107	no	4200	Undesirable.

EXAMINATIONS OF MISCELLANEOUS WATERS FROM

PARTS PER

Sample number.	Place.	Date collected.		Source of sample.	Cause for examination.	Color.	Turbidity.	Sediment.	Odor.
		Month.	Day.						
3138	Hamilton Co., Sycamore Tp.	10	1	Dug well.	School.	15	200	S.	none
3139	Same.	10	1	Dug well.	School.	tr	none	none	none
3140	Same.	10	1	Dug well.	School.	tr	none	tr	none
3141	Same.	10	1	Dug well.	School.	tr	V. S.	S.	S. stale
3142	Same.	10	4	Dug well.	School.	none	V. S.	V. S.	none
3143	Same.	10	4	Dug well.	School.	10	V. S.	V. S.	none
3144	Same.	10	4	Dug well.	School.	40	95	S.	oysters
3145	Same.	10	4	Cistern.	School.	45	S.	V. S.	none
3146	Same.	10	4	Dug well.	School.	tr	none	none	none
3159	Saine.	10	8	Driven well.	School.	tr	none	mere tr	none
2735	Harrison.	4	7	Public well.	Quality.	tr	none	none	none
2894	Harrison.	7	14	Driven well.	Typhoid.	8	none	none	none
3077	Henry Co., Monroe Tp.	9	8	Driven well.	Dysentery.	7	tr	mere tr	ft. peculiar
2822	Hillsboro.	6	17	Filt. cistern.	Typhoid.	tr	tr	tr	faint
2852	Huron.	7	6	Well.	Typhoid.	tr	tr	tr	tr
2853	Huron.	7	6	Well.	Typhoid.	tr	tr	tr	tr
2854	Huron.	7	6	Well.	Typhoid.	tr	tr	tr	tr
2855	Huron.	7	6	Well.	Typhoid.	tr	tr	tr	tr
2856	Huron.	7	6	Well.	Typhoid.	tr	tr	tr	tr
2857	Huron.	7	6	Well.	Typhoid.	tr	tr	tr	tr
2946	Huron.	8	4	Dug well.	Typhoid.	10	13	tr	ft. earthy
3231	Huron Co., Greenwich Tp.	11	8	Dug well.	Typhoid.	10	V. S.	none	none
3232	Same.	11	8	Spring.	Typhoid.	10	V. S.	tr	none
3233	Same.	11	8	Dug well.	Typhoid.	10	V. S.	tr	none
3234	Same.	11	8	Dug well.	Typhoid.	10	V. S.	tr	none
3116	Klondike, Guernsey Co., Center Tp.	9	21	Dug well.	Typhoid.	5	none	none	earthy
3117	Same.	9	21	Dug well.	Typhoid.	none	V. S.	V. S.	none
3118	Same.	9	21	Dug well.	Typhoid.	none	S.	S.	veg.
3250	Kenton.	11	13	Waste water.	Inf. on sewage.	tr	tr	tr	tr
2902	Lakeside.	7	20	Drilled well.	Quality.	18	V. S.	tr	V. ft. earthy
2903	Lakeside.	7	20	Drilled well.	Quality.	18	S.	tr	V. faint
2905	Lakeside.	7	21	Drilled well.	Quality.	18	S.	tr	tr
3193	Lisbon.	10	20	Drilled well.	Quality.	none	none	tr	earthy
3194	Lisbon.	10	20	Dug well.	Quality.	tr	V. S.	tr	4 ptrefactive
3067	Lockbourne.	9	3	Dug well.	Typhoid.	lt. off	47	S.	veg.
2959	Mechanicsburg.	8	10	Driven well.	Typhoid.	15	64	S.	ft. earthy
2963	Millersport.	8	10	Dug well.	Typhoid.	tr	none	none	none
2964	Millersport.	8	10	Dug well.	Typhoid.	6	tr	mere tr	none
2965	Millersport.	8	10	Dug well.	Typhoid.	10	tr	tr	none
2966	Millersport.	8	10	Dug well.	Typhoid.	5	mere tr	mere tr	none
2967	Millersport.	8	10	Dug well.	Typhoid.	tr	none	none	none
3084	Millersport.	9	8	Dug well.	Typhoid.	5	tr	mere tr	none
3085	Millersport.	9	8	Dug and d well.	Typhoid.	7	47	con	earthy
3086	Millersport.	9	8	Dug well.	Typhoid.	5	S.	S.	ft. earthy
3087	Millersport.	9	8	Dug and d well.	Typhoid.	9	mere tr	mere tr	none
3088	Millersport.	9	8	Dug well.	Typhoid.	8	mere tr	none	none
3089	Millersport.	9	8	Dug well.	Typhoid.	5	mere tr	none	none
2727	Mingo Junction.	4	3	Dug well.	Typhoid.	15	tr	tr	V. faint
2824	Mingo Junction.	6	22	Drilled well.	Quality.	15	tr	mere tr	tr
2798	Mingo Junction.	6	1	Dug well.	Quality.	8	tr	none	none
2800	Mingo Junction.	6	1	Spring.	Quality.	tr	none	none	none
2720	Montgomery Co., German Tp.	4	1	Dug well.	Typhoid.	7	none	trace	faint
3004	Mt. Sterling.	8	24	Dug well.	Quality.	10	tr	V. S.	none
3274	Newcomerstown.	11	23	Driven well.	Flux & m'ria.	10	tr	V. S.	none
3275	Newcomerstown.	11	23	Driven well.	Typhoid.	10	tr	tr	none
2667	Oxford.	1	15	Dug well.	Typhoid.	tr	none	tr	none
2668	Perry Co., Monroe Tp.	1	20	Dug well.	Typhoid.	13	tr	tr	none
2681	Perry Co., Monroe Tp.	2	13	Dug well.	Typhoid.	8	none	none	woody, rain
2691	Perry Co., Hopewell Tp.	2	19	Dug well.	Typhoid.	5	none	none	water.
2672	Same.	1	26	Dug well.	Typhoid.	10	none	none	none
2891	Perry Co., Monroe Tp.	7	13	Dug well.	Typhoid.	tr	tr	S.	none
2951	Perry Co., Thorn Tp.	8	6	Spring.	Typhoid.	5	none	none	none

*Date received.

PRIVATE SUPPLIES AND SPECIAL SOURCES—Continued.

MILLION.

Oxygen required.	Nitrogen as				Chlorine.	Alkalinity.	Total solids.	Colon present in 1 cc.	Bacteria per cc.	Remarks.
	Albuminoid ammonia.	Free ammonia.	Nitrites.	Nitrates.						
1.43	.074	.012	.002	3.4	55.9	338	1609	no	170	Objectionable in appearance and mineral character.
1.27	.018	.000	tr	8.2	46.9	267	732	no	2000	Usable. Protect.
.80	.036	.026	.016	tr	38.8	424	647	no	250	Protect.
.99	.072	.022	tr	none	5.4	261	258	no	9900	Usable.
.79	.063	.050	.020	2.0	17.1	378	448	no	900	Protect.
.77	.040	.013	tr	6.0	10.0	375	556	no	1500	Remove privy.
5.63	.214	.014	none	none	18.4	391	692	no	700	Usable, not wholly desirable.
9.78	.267	.248	none	none	1.5	67	106	no	1400	Usable.
1.00	.049	.015	.010	24.0	6.3	431	1011	no	1000	Remove pollution.
.....	.013	.002	tr	none	20.8	.....	.....	in 1 cc	1100	Suspicious. See 3120.
.41	.013	.002	none	none	2.8	234	322	.....	.....	Usable.
.82	.042	.008	none	11.5	30.6	287	587	no	20	Usable.
1.61	.052	.396	none	none	19.9	91	1609	no	120	Undesirable.
1.47	.057	.036	.005	.6	3.2	63	130	no	500	Usable.
3.10	.....	.600	.....	8.0	39.2	.....	.....	.....	.....	Polluted. Close.
4.92	.....	.012	20.0	235.0	.....	.....	.....	.....	.....	Polluted. Close.
3.75	.....	none	none	20.2	.....	.....	.....	.....	.....	Asked second sample. See 2946.
5.56	.....	.070	80.0	274.0	.....	.....	.....	.....	.....	Polluted. Close.
2.56	.....	.400	8.4	95.4	.....	.....	.....	.....	.....	Polluted. Close.
2.19	.....	.016	11.0	62.8	.....	.....	.....	.....	.....	Polluted. Close.
3.05	.186	.170	none	2.4	21.7	409	807	in 50 cc	300	Advised abandoning.
1.44	.106	.028	tr	20.0	39.7	380	719	no	550	Advised abandoning.
1.39	.072	.024	.002	8.0	7.8	175	326	in 1 cc	1400	Polluted. Poor location.
1.79	.060	.014	tr	1.4	38.2	438	595	no	600	Usable.
1.41	.050	.008	tr	10.0	28.4	258	465	no	550	Protect if used.
.78	.034	.028	.024	24.0	24.4	15	219	in 1 cc	500	Polluted. Close.
.70	.026	.020	tr	8.0	7.9	74	174	no	100	Usable.
.56	.044	.040	.060	16.0	34.6	64	338	in 1 cc	1100	Polluted. Close.
.....	.....	.....	tr	7.6	353	.....	.....	.....	160000	Not acid.
5.37	.....	.....	tr	21.0	32.5	.....	.....	in 50 cc	11000	Unsafe. See 2903.
3.41	.176	.016	none	9.6	19.8	336	601	no	8500	Unsafe.
1.27	.022	.006	.004	tr	4.7	240	368	no	190	Usable. Poor surroundings.
.64	.026	.104	.018	5.0	24.3	304	386	no	15	Remove pollution.
.49	.020	.012	.012	2.0	18.6	74	243	in 1 cc	475	Advised abandoning.
32.36	.216	.018	none	8.0	12.7	294	502	in 1 cc	9000	Polluted. Close.
1.27	.044	.170	none	none	2.6	416	544	no	35	Usable.
2.21	.078	.018	tr	21.6	134.5	389	1748	in 50 cc	230	Condemned.
1.80	.046	.044	.003	9.6	36.6	262	830	in 1 cc	700	Condemned.
1.63	.037	.009	.120	12.4	12.7	266	721	in 1 cc	170	Condemned.
1.86	.088	.010	.036	20.4	61.0	288	1041	in 1 cc	2500	Condemned.
1.36	.048	.014	none	25.2	38.8	242	921	no	150	"Past pollution."
1.00	.052	.004	.022	.2	8.1	265	466	no	10200	Not satisfactory.
.99	.042	.534	.002	none	2.3	329	858	no	325	Usable.
1.71	.070	.078	.005	none	9.7	246	667	no	12500	Undesirable.
1.06	.051	.072	.002	.4	14.7	299	890	yes	5700	Advised abandoning.
1.48	.088	.028	.030	12.2	36.6	233	1811	no	900	Polluted.
1.28	.080	.006	.030	12.6	37.8	227	1275	no	1500	Polluted.
.....	.....	.006	45.0	55.4	.....	.....	.....	yes	700	Polluted.
.66	.074	.096	.003	3.8	72.2	128	662	no	375	Usable.
.80	.012	.076	.002	1.8	45.2	101	460	no	1250	Usable. Protect.
.58	.027	.009	.003	17.4	53.4	25	368	no	2100	Poor for spring.
1.21	.042	.016	.007	none	3.8	310	656	no	110	Usable
.....	.....	.006	19.8	106.6	.....	.....	.....	yes	1100	Polluted.
.60	.016	.000	.005	1.6	43.6	158	490	no	48	Usable.
.38	.....	tr	1.6	.....	.....	.....	.....	no	7	Potable.
2.35	.102	.018	.002	4.80	25.8	228	544	no	2000	Advised abandoning.
3.37	.116	.142	.052	28.00	59.4	60	693	yes	1000	Polluted. Close.
2.84	.154	.366	none	3.6	11.0	6	711	.....	300	Advised abandoning.
.79	.022	.003	tr	21.5	35.0	79	327	yes	500	Advised closing.
.76	.092	.003	none	26.00	13.7	24	216	yes	3200	Polluted. Close.
.94	.028	.038	.001	1.2	6.2	220	304	yes	3800	Close. Bad history.
.88	.040	.062	none	none	1.9	286	391	no	850	Usable. Poor location.

EXAMINATIONS OF MISCELLANEOUS WATERS FROM

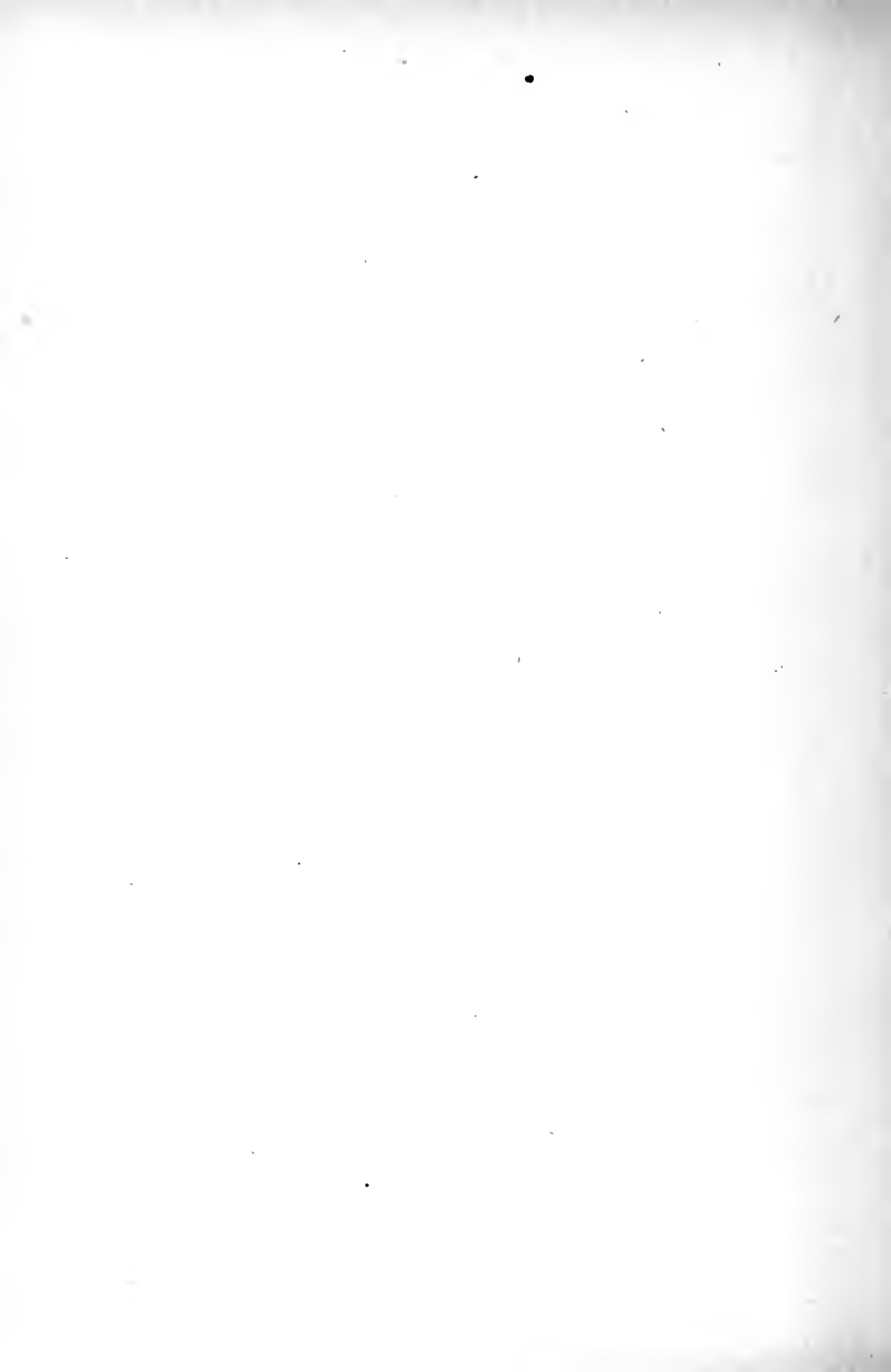
PARTS PER

Sample number.	Place.	Date collected.		Source of sample.	Cause for examination.	Color.	Turbidity.	Sediment.	Odor.
		Month.	Day.						
2952	Piqua.....	8	6	Driven well..	Typhoid.....	9	15	tr	V. faint
3204	Piqua.....	10	26	Factory.....	Quality.....		V. S.	V. S.	none
3205	Piqua.....	10	26	Drilled well..	Quality.....	tr	none	V. S.	none
2925	Randolph.....	7	23	Dug well.....	Typhoid.....	13	none	none	Ft. peculiar
2686	Rendville.....	12	16	Dug well.....	Typhoid.....	10	tr	S. tr	none
2687	Rendville.....	12	16	Dug well.....	Typhoid.....	8	none	none	none
2688	Rendville.....	12	16	Dug well.....	Typhoid.....				
2689	Rendville.....	12	16	Dug well.....	Typhoid.....				
3003	Rushsylvania.....	8	22	Dug well.....	Quality.....	34			
3133	Russellville.....	9	24	Dug well.....	Typhoid.....	none	none	V. S.	none
3134	Russellville.....	9	24	Dug well.....	Typhoid.....		V. S.	V. S.	none
3135	Russellville.....	9	24	Dug well.....	Typhoid.....		V. S.	V. S.	none
2977	Salem.....	8	17	Drilled well..	Typhoid.....				
2980	Salem.....	8	20	Drilled well..	Typhoid.....	5	mere tr	tr	ft.
3168	Salem.....	10	12	Drilled well..	Quality.....	10	tr	tr	none
3280	Salem.....	11	30	Dug well.....	Typhoid.....		none	S.	none
2795	Sandusky.....	5	28	Dug & d well..	Typhoid.....		tr	tr	Ft. vegetative
3164	Scioto Co., Clay Tp.	10	12	Dug well.....	Typhoid.....	none	tr	tr	S. putref'ctive
3165	Same.....	10	12	Dug well.....	Typhoid.....	23	tr	tr	faint
3180	Same.....	10	12	Dug well.....	Typhoid.....	25			
3181	Same.....	10	12	Dug well.....	Typhoid.....	20			
2701	Sidney.....	3	17	Dug well.....	Typhoid.....	9	tr	tr	none
3107	Simons.....	1	17	Driven well..	Quality.....	tr	tr	none	none
2765	Somerset.....	4	23	Dug well.....	Quality.....				
2766	Somerset.....	4	23	Dug well.....	Quality.....				
2816	Somerset.....	6	9	Drilled well..	Quality.....				
2961	Somerset.....	8	10	Drilled well..	Quality.....	10			
3235	St. Marys.....	11	9	Spring.....	Quality.....	none	none	none	none
3366	Summit Co., Coventry Tp.	12	28	Dug well.....	Typhoid.....	none	none	none	faint
3367	Same.....	12	28	Drilled well..	Typhoid.....	none	tr	tr	none
3238	Summit Co., Norton Tp.	11	..	Dug well.....	Typhoid.....	tr	V. S.	V. S.	faint
3186	Tiffin.....	10	16	Pond.....	Riv'r poll'tion	2750	1700	con	5 str'wbd ref'se
3187	Tiffin.....	10	16	S'ndusky riv'r	Riv'r poll'tion	55	68	distinct	3 str'wbd ref'se
3188	Tiffin.....	10	16	S'ndusky riv'r	Riv'r poll'tion	40	40	distinct	3 musty
2764	Trumbull Co., Liberty Tp.	4	23	Dug well.....	Typhoid.....	tr	none	none	faint
2922	Warren.....	7	21	Drilled well..	Bowel trouble	10	tr	tr	peculiar
2789	Wamsley.....	5	26	Dug well.....	Typhoid.....	23	24	tr	none
2790	Wamsley.....	5	26	Dug well.....	Typhoid.....				
2791	Wamsley.....	5	26	Dug well.....	Typhoid.....				
2792	Wamsley.....	5	26	Dug well.....	Typhoid.....	30	20	S.	trace
2793	Wamsley.....	5	26	Dug well.....	Typhoid.....				
2927	Washington Co., Decatur Tp.	7	23	Dug well.....	Typhoid.....	31	S.	S.	earthy
2784	Wellsville.....	5	11	Drilled well..	Quality.....	10	tr	tr	none
2974	Yellow Springs.....	8	13	Dug well.....	Typhoid.....	10	mere tr	mere tr	none
2975	Yellow Springs.....	8	13	Drilled well..	Typhoid.....	7	tr	tr	none
3090	Yellow Springs.....	9	10	Drilled well..	Typhoid.....	5	none	mere tr	none
3091	Yellow Springs.....	9	10	Drilled well..	Typhoid.....	5	tr	mere tr	none
3092	Yellow Springs.....	9	10	Drilled well..	Typhoid.....	8	none	mere tr	none
3254	Yellow Springs.....	11	16	Drilled well..	Quality.....	tr	none	mere tr	faint
3255	Yellow Springs.....	11	16	Drilled well..	School.....	tr	none	mere tr	none
2815	Zanesville.....	6	5	Spring.....	Quality.....	tr	none	none	none

PRIVATE SUPPLIES AND SPECIAL SOURCES—Concluded.

MILLION.

Oxygen required.	Nitrogen as				Chlorine.	Alkalinity.	Total solids.	Colon present in 1 cc.	Bacteria per cc.	Remarks.
	Albuminoid ammonia.	Free ammonia.	Nitrates.	Nitrates.						
1.27	.032	.003	none	28.8	39.4	321	802	yes	4700	Polluted. Close.
			.002	none	2.0	200		no	120	Usable.
.75	.036	.136	tr	none	10.7	338	341	no	140	Potable.
3.62	.122	.016	.002	17.5	33.7	92	617	yes...	4300	Polluted. Unsafe.
1.87	.068	.016	none	46.8	74.4	17	672			Close. Past pollution.
2.41	.080	.006	.003	22.0	202.0	57	870			Close. Past pollution.
			.005	27.0	55.2			yes	1700	Condemned.
			tr	46.0	226.8			yes	3500	Condemned.
			.160	tr	100.6			yes	12300	Polluted.
1.72			.016	35.0	74.5	768		no	21000	Polluted.
3.93			.005	15.0	57.8	876		no	13700	Polluted.
.76			.030	50.0	179.7	1230		no	87000	Polluted.
			.008	none				no	1300	Usable?
.65	.097	.298	.010	none	6.8	250	363			Suspicious.
.73	.032	.356	.002	none	7.3	481	1366	no	1200	Usable.
.16	.024	.018	tr	8.0	41.1	215	596	no	25	Usable.
2.11	.074	.054	.003	3.7	14.0	299	697	yes	475	Polluted.
4.79	.026	.012	.006	3.4	14.8	36	175			Undesirable.
1.10	.052	.028	.036	5.0	6.9	52	1126			Suspicious.
			none	none	2.0			no	14500	Usable.
			.006	none	11.8			no	2100	Usable.
1.61	.152	.005	.022	55.0	44.5	336	889	yes	350	Polluted. Close.
.64	.026	.126	none	none	6.6	170	393	no	6	Potable.
					45.4			yes	1000	Polluted.
					45.8			no	110	Usable.
			.060	35.2	93.0			yes	2100	Polluted. Close.
			.400	36.0	20.1			yes	2400	Polluted. Close.
1.57	.056	.114	.016	14.0	61.7	440	786	no	14	Polluted. Condemn
.67	.016	.010	none	7.0	8.2	32	126	no	275	Usable?
.35	.022	.002	none	1.6	1.5	220	354	no	300	Potable.
2.43			tr	none	26.5	578		yes	7500	Advised closing.
680.00	13.40	.220	none	none			4266	none		Strawboard refuse.
35.04	.692	.080	none	none	376.9	235	1242	7.15		Polluted by 3186.
7.06	.300	.152	.018	none	390.0	211	1205	10.66		Polluted by sewage.
2.18	.058	.016	none	35.0	41.0	145	606	no	800	Advised abandoning.
3.46	.034	.078	none	none	603.9	578	1716	no	2700	Not usable.
1.56	.038	.010	none	1.2	1.7	24	97	yes	950	Suspicious.
			none	1.0	2.0			yes	775	Undesirable.
			none	.8	1.4			yes	225	Undesirable.
2.18	.064	.012	none	1.0	3.2	9	97	yes	5100	Suspicious.
			none	8.0	14.0			no	210	Undesirable.
6.18	.148	.034	.002	6.5	59.9	42		no	1400	Advised abandoning.
1.67	.049	.416	none	none	140.0	297	641	no	250	Usable.
1.02	.052	.009	.018	6.8	36.9	268	545	yes	900	Polluted.
.77	.042	.008	.002	18.6	32.2	369	702	yes	475	Polluted.
.57	.050	.011	none	22.4	20.7	264	1045	no	80	Too much past pollution.
.88	.056	.014	none	11.4	41.8	337	981	yes	1100	Unsafe.
.94	.065	.028	none	31.0	41.8	324	1170	yes	2400	Unsafe. See 3255
1.01	.050	.006	tr	15.0	31.0	417	632	no	65	Too much past pollution.
.57	.036	.010	.002	36.0	49.0	388	837	no	1300	Not safe. Past pollution.
1.23	.029	.004	none	6.3	33.0	170	683	no	55	Usable if protected.



CITY AND VILLAGE
BOARDS OF HEALTH

NAME OF HEALTH OFFICER.

[CORRECTED TO APRIL 1, 1904.]

HEALTH OFFICERS OF CITIES AND VILLAGES.

Place.	Health Officer.
Aberdeen	Dr. S. A. Laughlin
Ada	Mr. W. H. Morrow
Addyston	*Dr. J. B. Hannah
Adelphi	Mr. W. S. Koch
Adrian	
Agosta P. O. (New Bloomington) ..	
Akron	Dr. A. A. Kohler
Albany	Dr. A. F. Holmes
Alexandria	
Alger	Mr. Albert Simmons
Allentown	
Alliance	Dr. P. W. Welker
Alvordtown	Dr. T. E. Schrider
Amanda	Mr. Luther Conrad
Amelia	*Dr. C. C. Warden
Amesville	Dr. E. E. Gillilan
Andover	Mr. F. L. Sargent
Anna	Dr. D. R. Millette
Ansonia	*Dr. C. I. Stephen
Antioch	
Antwerp	Mr. E. K. Terwilleger
Apple Creek	Dr. W. H. Winkler
Arcadia	*Mr. W. W. Moore
Arcanum	Mr. James Wallace
Archbold	Mr. August Ruihley
Arlington	Mr. Solomon Bates
Arlington Heights	
Arnettsville (Pittsburgh P. O.)	
Ashland	Dr. F. V. Dotterweich
Ashley	Dr. M. B. McGonigle
Ashtabula	Dr. A. W. Hopkins
Ashville	Mr. John Johnson
Athalia	
Athens	Dr. J. M. Higgins
Attica	*Dr. C. A. Force
Avon	Dr. John R. Pipes
Bainbridge	*Dr. R. H. McKee
Bairdstown	Dr. R. H. Quick
Bakersville	Dr. J. D. Lower
Baltimore	Dr. C. M. Alt
Barberton	*Dr. W. A. Mansfield

* In lieu of a board of health.

Place.	Health Officer.
Barnesville	Dr. D. O. Sheppard
Barnhill	Mr. John Stevenson
Batavia	Dr. Charles R. Belt
Batesville	Mr. Caleb Mercer
Beach City	Dr. I. M. Pfouts
Beallsville	Mr. A. C. Harper
Beaver	*Mr. Joseph M. Swan
Beaver Dam	Dr. J. B. Haines
Bedford	Mr. Thos. E. Matheus
Bellaire	Dr. D. W. Boone
Bellbrook	Mr. R. M. Martz
Belle Centre	Mr. J. T. Ewing
Bellefontaine	Dr. J. S. Deemy
Belleville	Dr. C. E. Hunter
Bellevue	Mr. Charles Bilger
Belmont	Mr. David S. Pierce
Belmore	Dr. G. B. Adrian
Beloit	*Mr. R. R. Boyle
Belpre	Mr. Joseph Sharp
Benton Ridge	Dr. R. D. Whisler
Berea	Mr. T. L. McKean
Berlin Heights	*Dr. G. W. Hine
Berne P. O. (Carlisle)	*Dr. G. G. Mallett
Bethel	*Dr. W. E. Thompson
Bettsville	Dr. George W. Williard
Beverly	Mr. George A. Radenbach
Blakslee	*Mr. J. R. Whaley
Blanchester	*Mr. U. B. Chambers
Bloom Center	Dr. O. C. Wilson
Bloomdale	Mr. E. Wineland
Bloomfield (Bloomington P. O.)	
Bloomingsburg	*Mr. H. A. Pinkerton
Bloomington P. O. (Bloomfield)	Mr. E. R. Blackburn
Bloomville	Dr. T. C. Loose
Bluffton	Dr. John J. Sutter
Bolivar	*Mr. Conard H. Lebold
Bond Hill (part of Cincinnati)	
Boston (Owensville P. O.)	
Botkins	Mr. Allen Wical
Bourneville	Dr. J. A. VanWinkle
Bowerston	*Mr. David Denny
Bowersville	*Mr. J. E. Steward
Bowling Green	Mr. Wm. Zimmerman
Bradford	Mr. John Tinkler
Bradner	*Mr. O. J. Mitchell
Bremen	Dr. F. P. Strayer
Bridgeport	Dr. V. Wagener
Brilliant	Mr. A. McIntire
Brinkhaven P. O. (Gann)	Mr. J. T. Dewitt, mayor.
Brooklyn (South Brooklyn)	Mr. Julius Renker

* In lieu of a board of health.

Place.	Health Officer.
Brooklyn Heights	*Mr. Joseph E. Richardson
Brookville	Dr. H. W. McMillen
Broughton	*Mr. J. L. Boroff
Bryan	Mr. Nicholas Vineyard
Buchtel	Dr. A. K. Walker
Buckeye City	Mr. F. M. Welker
Buckland	
Bucyrus	Dr. A. H. McCrory
Burbank	Mr. A. W. Hoffman
Burkettsville	Dr. B. G. Inman
Burton	Dr. W. H. Shank
Butler	*Dr. E. G. Rummel
Butlerville	
Byesville	Mr. C. C. Large
Cadiz	*Dr. S. B. McGavran
Calais	*Dr. J. J. Burton
Caldwell	Dr. Jno. Finley
Caledonia	Mr. Noah Lee
Cambridge	Mr. T. C. Stanley
Camden	Dr. W. E. Pryor
Canal Dover	Mr. Herman F. Eppens
Canal Fulton	Mr. Wm. Logan
Canal Winchester	Dr. W. S. Gayman
Canfield	Mr. A. D. Woods
Cannelsville (Dillons, P. O.)	
Canton	Dr. J. F. Marchand
Cardington	Mr. W. H. VanHorn
Carey	*Dr. R. C. Van Buren
Carlisle (Berne P. O.)	
Carroll	Dr. H. A. Brown
Carrollton	Dr. A. H. Hise
Carthage	*Mr. F. S. Staaf
Casstown	*Dr. W. W. Baker
Catawba	Dr. J. D. Thomas
Cecil	Dr. S. E. DeMuth
Cedarville	Mr. M. H. Shroads
Celina	Dr. Joseph Sager
Centerburg	Mr. J. B. Messmore
Centerville	*Dr. B. W. Dudley Keever
Centerville (Thurman P. O.)	
Chagrin Falls	Mr. W. J. Clark
Chambersburg (Eureka P. O.)	*Mr. William T. Rouse
Chardon	Mr. P. F. Walthour
Chatfield	*Mr. Samuel Lutz
Chester Hill	Mr. Jonathan Morris
Chesterville	Dr. W. C. Hodges
Cheviot	*Mr. George B. Tait
Chicago Junction	Dr. A. R. Kauffman
Chickasaw	Mr. H. S. Shaefer
Chillicothe	Dr. W. S. Scott

* In lieu of a board of health.

Place.	Health Officer.
Cincinnati	Dr. Clark W. Davis
Circleville	Mr. Wm. H. Dunkel
Clarington	Mr. C. T. Reilly
Clarksburg	*Mr. John Waggaman
Clarksville	*Mr. Luther Snook
Cleveland	Dr. Martin Friedrich
Cleveland Heights	*Dr. W. E. Shackleton
Cleves	*Dr. W. S. Bogart
Clifton	Dr. J. H. Harris
Clinton (Fitchville P. O.)	
Clyde	Mr. F. G. Tuttle
Coal Grove	Dr. W. M. Shattuck
Coalton	*Mr. J. C. Duncan
Coldwater	Dr. C. F. Bollman
College Corner	
College Hill	Mr. J. E. Deininger
Collinwood	*Dr. W. H. Williams
Columbiana	Mr. George Roninger
Columbus	Dr. McKendree Smith
Columbus Grove	*Mr. J. F. Bogart
Commercial Point	Mr. W. J. Rout
Congress	Dr. George E. Essick
Conneaut	Mr. O. N. Warner
Continental	Mr. Wm. Saegers
Convoy	Mr. C. D. Sidle
Coolville	Dr. A. M. Frame
Copley	Mr. O. E. Arnold
Corning	Mr. Wm. Anderson
Cortland	Dr. J. Ward
Corwin	
Coshocton	Dr. I. E. Foster
Covington	Mr. R. M. Shellabarger
Crestline	Mr. A. S. Cover
Creston	*Mr. C. A. Mellen
Cridersville	Mr. F. L. Newcomer
Crooksville	Mr. Mike McGavern
Croton P. O. (Hartford)	*Dr. S. S. Reynolds
Crown City	*Mr. J. V. Stevers
Cumberland	*Dr. A. E. Walters
Custar	*Mr. Edward France
Cuyahoga Falls	*Mr. W. W. Scupholm
Cygnets	Mr. D. J. Baker
Dalton	*Mr. F. F. H. Bope
Danville	Dr. C. R. Bradfield
Darbyville	Mr. M. N. Bowman
Dayton	Dr. C. W. King
Deavertown	
Deerfield (South Lebanon P. O.)...	
Deersville	Dr. Frank James

* In lieu of a board of health.

Place.	Health Officer.
Defiance	Dr. M. B. Stevens
Degraff	Mr. Amos J. McElroy
Delaware	Dr. O. W. Bonner
Delhi	Mr. M. F. Andrew
Dell Roy	*Mr. Adam H. Kible
Delphos	Dr. N. E. Brundage
Delta	Dr. Wm. Ramsey
Dennison	Dr. L. H. Hughes
Deshler	*Mr. Isaac Collins
Dexter City	*Dr. E. E. Coborn
Dillons, P. O., (Cannelville)	*Dr. D. W. Trout
Dillonvale	*Mr. Ross Blazer
Donnelsville	Dr. Horace Heistand
Doylestown	*Mr. F. C. Hummel
Dresden	Mr. C. W. Carter
Dublin	*Dr. Charles L. Dolle
Dunkirk	*Dr. C. C. McLaughlin
Dupont	*Mr. H. P. Senger
East Cleveland	Mr. J. H. Stamberger
East Fairfield	Dr. G. H. Albright
East Liverpool	Dr. C. B. Ogden
East Palestine	Mr. L. Neville
East Springfield	*Dr. Harry L. Fiscus
Eaton	Mr. John McDonald
Edgerton	Dr. C. Hathaway
Edison	Mr. G. G. Thomas
Edon	Mr. H. F. Alwood
Eldorado	Mr. Philip Coons
Elgin	Dr. L. P. Jackson
Elida	Dr. S. A. Hitchcock
Elmore	*Dr. R. A. Willett
Elmwood Place	Dr. E. T. Busching
Elyria	Dr. George E. French
Empire	Mr. John Hunter
Enon	Mr. Jas. P. Pierce
Eureka P. O. (Chambersburg)	*Mr. William T. Rouse
Evanston (part of Cincinnati)	
Fairfield	
Fairmount	Mr. L. Hunter, clerk
Fairport	Mr. J. H. Werbeach
Fairview	Dr. F. W. Lane
Farmersville	*Mr. A. W. Beal
Fayette	Mr. Albert Ford
Fayetteville	
Felicity	*Mr. M. H. Tucker
Fernbank	Mr. James E. Hickman
Findlay	Mr. Amos Beardsley
Fitchville P. O. (Clinton)	
Five Points	
Fletcher	Dr. J. B. Barker
Florida	Mr. Wm. Thompson

* In lieu of a board of health.

Place.	Health Officer.
Flushing	Dr. Thos. Blackwood
Forest	Mr. John Hanchy
Fort Jennings	Dr. J. E. Stephan
Fort Recovery	Dr. W. R. Taylor
Fostoria	Mr. W. N. Caldwell
Fowler	Mr. C. D. Williamson
Frankfort	Dr. L. N. Matteson
Franklin	Dr. D. A. Williams
Frazeysburg	*Dr. Jasper Corn
Fredericksburg	Dr. F. S. McKinney
Fredricktown	Mr. Thos. Burke
Freeport	*Mr. W. H. Lewis
Freeport (Prairie Depot P. O.)	
Fremont	Dr. O. C. Vermilya
Fultonham P. O. (Uniontown)	Dr. C. Z. Axline
Gahanna	Mr. D. L. Stygler, mayor
Galion	Dr. H. H. Hartman
Gallipolis	Mr. Charles B. Robinson
Gambier	Dr. A. D. Welker
Gann (Brinkhaven P. O.)	
Garrettsville	Dr. C. A. Snow
Geneva	Dr. F. C. Smith
Genoa	Mr. Chas. M. Siglar
Georgetown	*Mr. W. P. Bradford
Germantown	Mr. William Schaeffer
Gettysburg	
Geyer	*Mr. James Snyder
Gibsonburg	Mr. W. O. Dipman
Gilboa	Dr. Bruce Snodgrass
Girard	Dr. F. C. Hunt
Glandorf	Mr. Joseph Horstman
Glendale	*Mr. Clifford Allen
Glenmont	Mr. George L. Robinson, mayor.
Glenville	Mr. B. F. Carpenter
Glouster	Dr. Henry G. Gibson
Gnadenhutten	
Good Hope	Mr. D. C. Somers
Gordon	Mr. H. Y. Silner
Grafton	*Mr. Asa Linderman
Grand Rapids	*Mr. J. H. Williams
Grand River P. O. (Richmond)	Mr. H. J. Valteau
Grandville	Dr. W. E. Clemons
Gratis P. O. (Winchester)	Mr. Fred Boesenberg
Graysville	Mr. W. E. Baker
Green Camp	*Mr. G. W. Collins
Greenfield	*Mr. C. S. Clouser
Green Springs	Dr. R. D. Reynolds
Greenville	Dr. E. C. Ballard
Greenwick	Mr. Wilber Holden
Grove City	Mr. M. L. Harsh
Groveport	Dr. C. R. Clement

* In lieu of a board of health.

Place.	Health Officer.
Grover (Tiltonville P. O.)	
Grover Hill	Mr. E. L. Shaw
Hagermans P. O. (Rossville)	*Mr. Daniel H. Brown
Hamden Junction	Mr. George Wilber
Hamersville	
Hamilton	Dr. Mark Millikin
Hammondsville	
Hamler	Mr. Wm. Barhite, Sr.
Hanging Rock	Mr. Joseph Kinkaid
Hanover	
Hanoverton	Mr. Henry C. Dutton
Harlem Springs	
Harmar (part of Marietta)	
Harrisburg	*Mr. Fred Bartsch
Harrison	Mr. Abe Loos
Harrisville	Mr. W. C. Toland, mayor
Harrod	*Mr. John Blair, Sr.
Hartford	*Dr. S. S. Reynolds
Hartwell	*Dr. O. W. Butler
Harveysburg	
Haskins	Dr. H. J. Johnston
Haviland	
Hayesville	Mr. Dill Address
Hebron	*Dr. O. M. Kramer
Hemlock	
Herring P. O. (Lafayette)	Dr. N. Sager, Jr.
Hicksville	Mr. Amos Forlow
Higginsport	*Mr. F. M. Cahill
Highland P. O. (New Lexington) ..	
Hilliards	*Dr. James W. Reason
Hillsboro	Dr. J. D. McBride
Hiram	Dr. F. H. Hurd
Holgate	Mr. W. S. Smith
Hollansburgh	*Dr. A. W. Meek
Holmesville	Mr. C. W. McClelland
Home City	Dr. B. F. Lehman
Hopedale	Dr. L. A. Crawford
Hoytsville	Mr. W. N. Hood
Hubbard	Dr. W. S. Bond
Hudson	Dr. H. C. Coolman
Huntsville	*Dr. George W. Jones
Huron	Mr. S. N. Lennon
Hyde Park (part of Cincinnati)	
Independence	
Irondale	Mr. Alex Hamlin
Ironton	Dr. J. W. Lowry
Ithaca	Dr. J. C. Hamilton
Jackson	Mr. W. H. Brunton
Jacksonboro	Mr. John Stamm
Jackson Centre	*Dr. A. V. Derr
Jacksonville	Dr. C. Von Scheele

* In lieu of a board of health.

Place.	Health Officer.
Jamestown	Mr. W. F. McMillen
Jefferson	Dr. G. O. Mahaffey
Jeffersonville	*Mr. N. C. Wilcox
Jenera	Mr. C. H. Heldman
Jeromeville	
Jerry City	Mr. Jas. McLaughlin
Jerusalem	Mr. J. A. Latham
Jewett	*Mr. Isaiah McMannis
Johnsonville	Mr. E. C. Hitchcock
Johnstown	Dr. J. N. Wright
Junction City	Dr. P. A. Gordon
Kalida	*Mr. W. W. Dunnavin
Kamms P. O. (Rockport)	Mr. Charles L. Wood
Kelley's Island	Dr. O. B. VanEpp
Kennedy Heights	
Kent	Mr. B. C. Newberry
Kenton	Mr. J. W. Hammond
Kettleville	
Killbuck	Dr. Emil J. Heinig
Kimbolton	Mr. S. A. Clarke
Kingston	Dr. C. C. Hatfield
Kirby	Dr. E. E. Burns
Kossuth	*Mr. T. J. Barnett
Lafayette (Herring, P. O.)	
LaGrange	Dr. J. W. Lindsey
Lakeside	Mr. Wm. Carroll
Lakeview	Dr. V. F. Barrett
Lakewood	Dr. A. E. McClure
Lancaster	Dr. George W. O'Grady
Larue	*Mr. George W. Long
Latty	Mr. George W. Davis
Laura	Dr. S. P. Neff
Laurelville	Dr. W. D. Cain
Lebanon	Dr. G. M. Curry
Leesburg	Dr. H. A. Beeson
Leesville	
Leesville X Roads	
Leetonia	Dr. S. R. McCready
Leipsic	Dr. John C. McClung
Lewisburg	Mr. A. N. Cox
Lewisville	Dr. J. W. Weber
Lexington	*Dr. J. P. Stober
Liberty Center	Mr. D. K. Bowker
Lima	Dr. A. L. Jones
Limaville	Mr. O. P. Sebrell
Lindsey	
Lisbon	*Mr. David H. Eells
Little Sandusky	
Lithopolis	Mr. F. W. Teas
Lockbourne	*Mr. J. W. Brothers
Lockington	Dr. J. Robt. Caywood, clerk

* In lieu of a board of health.

Place.	Health Officer.
Lockland	*Mr. Valentine Harting
Lodi	*Mr. Henry Selders
Logan	Dr. D. A. Rannells
London	*Dr. W. H. Christopher
Lorain	Dr. Edw. V. Hug
Loramie	Dr. Thomas Walkup
Loudonville	Mr. William Conrad
Louisville	Dr. F. W. Schilling
Loveland	*Dr. F. H. Lever
Lowell	Mr. A. J. Thompson
Lowellville	Mr. J. H. McWilliams
Lower Salem	Mr. J. P. Hartshorn
Lucas	Mr. Wm. Baer
Lynchburg	Mr. M. V. Nolder
Lyons	
McArthur	*Mr. George W. Partlow
McClure	Mr. E. E. Britton
McComb	*Mr. Scott W. Preble
McConnelsville	Mr. William Dille
McGuffey	Dr. J. B. K. Evans
Macksburg	*Mr. Julius B. DeLong
Madison	Mr. J. V. Winans
Madsonville	Dr. C. L. Metz
Magnetic Springs	Dr. C. L. Schwartz
Magnolia	Mr. L. H. Scheideger
Maineville	Mr. J. W. Tufts
Malinta	Mr. M. M. Spangler
Malta	Mr. W. R. Scott
Malvern	Dr. John A. Rhiehl
Manchester	Dr. R. A. Stephenson
Mansfield	Dr. A. H. McCullough
Mantua	
Marblehead	Mr. A. J. Clemons
Marengo	*Mr. A. L. Pegg
Marietta	Dr. Charles W. Race
Marion	Dr. E. H. Raffensperger
Marseilles	Mr. John C. Wartley
Marshallville	Dr. H. B. Willford
Martinsburg	
Martin's Ferry	Mr. R. A. Lindemuth
Martinsville	Dr. W. K. Ruble
Marysville	Dr. P. D. Longbrake
Mason	Dr. C. T. Hall
Massillon	Mr. Thomas H. Seaman
Maumee	Mr. P. Hartman
Mechanicsburg	Dr. J. C. Hathaway
Medina	*Mr. Allen Pomroy
Melrose	*Mr. T. J. Myers
Mendon	*Mr. F. Marion Rice
Mentor	*Dr. J. W. Lowe
Metamora	Mr. Augustus Reis

* In lieu of a board of health.

Place.	Health Officer.
Miamisburg	Dr. A. H. Blossom
Middleburg	Mr. C. C. Heath
Middle Point	
Middleport	Dr. David Sisson
Middletown	Dr. George D. Lummis
Midland (Midland City P. O.)	
Midland City	Dr. Leonidas Boulware
Midvale	
Midway (Sedalia P. O.)	
Mifflin	
Milan	Mr. Fred Collman
Milford	*Dr. Con. W. Gatch
Milford Centre	*Mr. J. W. Perkins
Millbury	Dr. C. M. Diebert
Milledgeville	Dr. W. T. Mathews
Miller City	Mr. F. M. Miley
Millers	Mr. M. McCown
Millersburg	Mr. Chas. A. Estill
Milton Center	Dr. J. F. Noble
Miltonsburg	*Dr. Chas. Keyser
Mineral City	Mr. C. C. White
Mineral Ridge	Dr. T. M. Elder
Minerva	*Dr. Arthur Thomas
Mingo Junction	Mr. Robert McElroy
Minster	*Mr. Christian Meyer
Mogadore	
Monroeville	Dr. E. R. Kreider
Montezuma	Dr. W. H. Tippie
Montpelier	Dr. J. V. Lesnet
Morristown	*Dr. D. T. Phillips
Morrow	Mr. A. J. Koeble
Moscow	Dr. W. S. Purkhiser
Mt. Airy	
Mt. Blanchard	*Mr. C. M. Wolford
Mt. Cory	Mr. Jacob Doty
Mt. Eaton	
Mt. Gilead	Dr. Wm. L. Case
Mt. Healthy	*Dr. Lafayette Neufarth
Mt. Orab	Mr. L. S. Vance
Mt. Pleasant	Mr. Thomas P. Gorsuch
Mt. Sterling	*Dr. C. T. Gallagher
Mt. Vernon	Dr. H. W. Blair
Mt. Victory	Dr. B. B. Morrow
Mt. Washington	*Dr. Wm. C. Langdon
Murray City	Dr. T. J. Dillenger
Mutual	Mr. C. M. Goul
Napoleon	Mr. D. H. Hancock
Nashville	*Mr. David Parks
Navarre	Mr. John Bailiss
Nelsonville	Dr. N. Hill
Nevada	*Dr. H. E. Dwire

* In lieu of a board of health.

Place.	Health Officer.
Neville	*Dr. A. Franco Joseph
New Alexandria	
New Albany	Mr. Christopher Horlocker
Newark	Dr. Henry Day
New Athens	Dr. Albert Dickerson
New Bloomington (Agosta P. O.) ..	
New Bremen	*Dr. Edward M. Phelps
Newburgh	Dr. C. L. McCoy
New Carlisle	*Mr. Wm. A. Higgins
Newcomerstown	Mr. Wm. Tidrick
New Concord	Dr. Henry McCreary
New Holland	*Mr. Thomas Doyle
New Knoxville	Dr. H. E. Fledderjohann
New Lebanon (Postdam P. O.)	
New Lebanon (Montgomery Co.) ..	*Mr. Lutil Piatt
New Lexington (Highland P. O.) ..	
New Lexington	Mr. J. W. Holden
New London	Mr. A. M. Turner
New Madison	Mr. J. F. S. Hageman
New Matamoras	Mr. Adam S. Miracle
New Paris	Dr. J. H. Guthrie
New Petersburg	
New Philadelphia	Dr. George H. Peck
New Richmond	Dr. J. A. Windsor
New Riegel	Mr. Anthony Imber
New Salem	
New Stark	
New Straitsville	*Mr. D. D. Richards
Newton Falls	*Dr. H. M. Mealey
New Vienna	*Dr. G. R. Conrad
New Washington	Dr. Burton R. Miller
New Waterford	Mr. A. J. Hayes
Ney	Dr. P. M. Lehman
Niles	Dr. Henry V. Ormerod
North Amherst	*Dr. Washington Foster
North Baltimore	Dr. J. W. Stoner
North Bend	
North Lewisburg	Mr. G. L. Freeman
North Lindale	Mr. H. Gearity
North Robinson	*Mr. James E. Morton
Norwalk	Dr. Edgar Martin
Norwich	Mr. L. D. Wilson
Norwood	Dr. J. C. Cadwallader
Nottingham	Dr. W. O. Jenks
Oak Harbor	Dr. S. D. Allen
Oak Hill	Mr. Wm. Jenkins
Oakley	Dr. W. L. Milner
Oakwood	*Mr. Allen Bidlack
Oberlin	Mr. E. L. Burge
Ohio City	Mr. S. R. Mapes
Olmsted Falls	Mr. H. B. Northrop

* In lieu of a board of health.

Place.	Health Officer.
Orangeville	*Dr. R. R. Root
Orrville	Dr. A. A. Brooks
Osborn	Mr. Ora Beakler
Osgood	Mr. William F. Davidson
Osnaburg	*Mr. B. F. Criswell
Ostrander	Dr. G. E. Cowles
Ottawa	Dr. E. L. Tupper
Ottoville	*Dr. J. F. Ockuly
Otway	Mr. Simon Crow
Owensville P. O. (Boston)	Dr. G. G. Rutledge
Oxford	*Mr. W. E. Calohan
Painesville	Mr. S. A. Haskell
Palestine	
Rome (Stouts P. O.)	
Pandora	
Pataskala	Mr. Frank McConnaughey
Patterson	Mr. Peter C. Breidenbach
Payne	Dr. J. E. Mulligan
Paulding	Dr. Ira J. Dix
Peebles	*Dr. George F. Thomas
Pemberville	Dr. R. J. Simon
Peninsula	Dr. W. N. Boerstler
Perrysburg	Mr. J. H. Hayes
Perrysville	Mr. D. W. Webster
Philo P. O. (Taylorsville)	Mr. Robert Longley
Pickerington	
Piketon	*Mr. Wm. C. Hays
Pioneer	Mr. B. F. Hosmer
Piqua	Dr. F. E. Kitzmiller
Pittsburg P. O. (Arnettville)	Dr. J. O. Starr
Plain City	*Mr. J. W. Latham
Plainfield	*Mr. James Magness
Pleasant City	*Mr. J. M. Oldroyd
Pleasant Hill	Mr. Daniel Brown
Pleasant Ridge	*Mr. Charles W. Acomb
Pleasantville	*Mr. M. B. McCleery
Plymouth	Dr. Geo. J. Searle
Poland	Dr. C. R. Justice
Polk	Dr. W. H. Rhinehart
Pomeroy	Dr. R. E. Stobart
Portage	*Mr. B. O. Fausnaugh
Port Clinton	Dr. H. J. Pool
Port Jefferson	*Dr. D. J. Cargill
Portsmouth	Dr. W. W. Smith
Port Washington	Dr. E. S. Dunn
Port Williams	Mr. S. L. Thorpe
Potsdam P. O. (New Lebanon)	*Dr. J. W. Shellabarger
Powhatan Point	Mr. Franz Saner
Prairie Depot P. O. (Freeport)	
Proctorville	Dr. R. E. Atkinson
Prospect	Mr. G. F. Gast

* In lieu of a board of health.

Place.	Health Officer.
Put-in-Bay	Mr. Adam Heidle
Quaker City	Mr. W. W. Dowdell
Quincy	Mr. George B. Plummer
Racine	*Mr. Elwood Davis
Rarden	Dr. H. F. Clark
Ravenna	Mr. F. A. Chamberlin
Rawson	Mr. Michael Smith
Reading	Mr. George Siebel
Rendville	*Dr. H. S. Cozad
Republic	Mr. C. E. Womer
Reynoldsburg	*Mr. B. F. Orem
Richmond (Grand River P. O.)	
Richmond (Jefferson Co.)	Dr. Samuel Rothacker
Richwood	Mr. C. W. Sloop
Ridgeway	Dr. E. B. Crow
Ringgold	
Ripley	Mr. G. M. Robb
Rising Sun	Mr. M. C. Mowen
Rochester	Dr. J. C. Dignan
Rock Creek	Dr. W. S. Weiss
Rockford	Mr. E. E. Jackson
Rockport	*Dr. Chas. L. Wood
Rocky Ridge	Mr. John Krampke
Rocky River	*Mr. K. K. Hastings
Rogers	*Mr. George N. McCamon
Rome (Souts P. O.)	
Roscoe	*Dr. A. M. Henderson
Roseville	*Mr. T. C. Hilliard
Rossville (Hagerman's P. O.)	
Rushsylvania	Mr. W. H. Drum
Rushville	Dr. W. C. Lewis
Russellville	
Sabina	*Dr. S. B. Lightner
St. Bernard	*Dr. A. C. Topie
St. Clairsville	*Dr. Samuel L. West
St. Louisville	
St. Marys	Dr. I. E. Williams
St. Paris	Dr. C. A. Offenbacher
Salem	Dr. E. J. Schwartz
Salesville	*Mr. Wm. T. Carpenter
Salineville	*Dr. H. M. Calvin
Sandusky	Dr. Wm. H. Busch
Sarahsville	Dr. W. S. Williams
Savannah	*Mr. John F. Brown
Scio	Dr. G. D. Custer
Scott	Mr. S. S. Beach
Sebring	Mr. Frank Chisler
Sedalia P. O. (Midway)	Dr. E. B. Mead
Senecaville	*Mr. Richard Lowry
Seven Mile	Mr. Henry Jacobs
Seville	Dr. P. E. Beach

* In lieu of a board of health.

Place.	Health Officer.
Sharon	Mr. J. A. Reid
Shawnee	*Emerson Peart
Shelby	Dr. A. C. Taylor.
Sherrodsville.....	Mr. Francis Henry
Sherwood	Dr. H. C. Lindersmith
Shiloh	Dr. S. S. Holtz
Shreve	Mr. V. D. Manson, Jr.
Sidney	Mr. Wm. C. Wyman
Sinking Spring	
Smithfield	Mr. Ross C. Moore
Smithville	Dr. H. Ambrose D. Schollenbarger
Somerset	Dr. Michael Clouse
Somerville	Mr. William H. Leever
South Bloomfield	Dr. C. E. Blacker
South Brooklyn (Brooklyn P. O.) ..	
South Charleston	*Mr. Washington Coss
South Lebanon (Deerfield)	Dr. A. D. Spence
South Point	*Dr. C. Wayne McCoy
South Salem	Dr. E. C. Lumbeck
South Solon	Dr. W. H. Queen
South Webster	
South Zanesville	Mr. B. A. Sumers
Sparta	Mr. S. G. Fowls
Spencerville	Mr. Fred Hirn
Springborough	Mr. John B. Bloss
Springfield	Dr. H. H. Seys
Spring Hills	Mr. Quincy T. Eleyet
Spring Valley	*Dr. S. E. Dyke
Steubenville	Mr. John Welch
Stewart	Mr. G. H. Hawk
Stockport	Mr. M. C. Riley
Stouts P. O. (Rome)	
Strasburg	Dr. J. C. Schutzbach
Struthers	*Mr. John F. Shafer
Stryker	*Dr. C. F. Mignin
Sugar Creek	
Sugar Grove	*Dr. Samuel Renshaw
Summerfield	Mr. John Banghin
Sunbury	Dr. G. H. Gerhardt
Swanton	Mr. Frank Minnick, clerk
Sycamore	Dr. W. H. Wickham
Sylvania	*Mr. G. A. Crandall
Syracuse	
Tarlton	Mr. W. A. Leist, clerk
Taylorville (Philo P. O.)	
Thornville	*Dr. Frank R. Clemson
Thurman P. O. (Centerville)	Mr. Gomer E. Jones
Tiffin	Dr. A. C. Schwartz
Tiltonville P. O. (Grover)	
Tippecanoe City	Mr. F. N. Agenbroad
Tiro	Dr. W. H. Guiss

* In lieu of a board of health.

Place.	Health Officer.
Toledo	Dr. W. W. Brand
Tontogany	*Dr. Thos. A. Bickerstaph
Toronto	*Mr. A. W. Goodlin
Trenton	
Trimble	Dr. H. D. Danford
Trinway	Mr. Leroy Rose
Troy	Dr. G. E. McCullough
Tuscarawas	Mr. M. A. Romig, mayor
Uhrichsville	Dr. Jas. A. McCollam
Union City	Mr. D. J. Wise
Uniontown (Fultonham P. O.)	
Unionville Center	Dr. C. O. McCune
Uniopolis	*Dr. J. W. Hurlburt
Upper Sandusky	*Dr. G. O. Maskey
Urbana	Dr. H. M. Pearce
Utica	Dr. G. T. Ely
Van Buren	Mr. Jas. P. Grubb, mayor
Vandalia	*Dr. W. H. Riley
Vanlue	Dr. Jas. L. Schrotz
Van Wert	Dr. C. G. Church
Venedocia	
Vermilion	Mr. J. M. Delker
Versailles	Dr. C. F. Ryan
Vienna (Vienna X Roads P. O.)	
Vienna X Roads P. O.	Dr. E. A. Dye
Vinton	Mr. Joel A. Pugh
Wadsworth	Dr. C. N. Lyman
Waldo	Dr. B. D. Osborn
Wapakoneta	Mr. A. Kohler
Warren	Dr. D. E. Hoover
Warsaw	Mr. S. W. Willis
Washington	Mr. S. B. Lawrence
Washington C. H.	Mr. F. N. Bateman
Washingtonville	Mr. William F. Culler
Waterloo (Pancoastburg P. O.)	
Waterville	Mr. H. T. Van Fleet
Wauseon	Mr. D. C. Teeter
Waverly	Mr. James J. Emmitt
Waynesburg	Dr. Gustav A. Shane
Waynesfield	Mr. F. M. Berry
Waynesville	Dr. C. W. Anderson
Webster	Mr. J. F. Byrd
Wellington	Mr. E. T. Robinson
Wellston	Mr. W. J. Brown
Wellsville	Dr. M. C. Tarr
West Alexandria	*Mr. Geo. W. Campbell
West Cairo	Dr. Chas. E. Stadler
West Carrollton	*Mr. Frank E. Hinkson
West Elkton	Dr. Elwood Holaday
Western Star	Mr. Fred Becker, Wadsworth, R. F. D. No. 2.

* In lieu of a board of health.

Place.	Health Officer.
Westerville	Mr. P. A. Conklin
West Framington	
West Jefferson	Mr. Martin Carroll
West Lafayette	Mr. Peter Johnson
West Leipsic	Dr. G. E. Garwood
West Liberty	*Dr. Edward R. Henning
West Manchester	*Mr. George W. Juday
West Mansfield	*Dr. H. A. Skidmore
West Middleburg	
West Mill Grove	
West Milton	Dr. Gainor Jennings
West Park (Rocky River P. O.)....	
Weston	Dr. Wm. W. Hill.
West Rushville	
West Salem	Mr. J. H. Wiley, mayor
West Union	Dr. James W. Bunn
West Unity	
West Wheeling	Mr. D. C. Peppard
Wharton	Mr. J. J. Mayer
Whitehouse	Mr. J. F. Lehman
Wilkesville	Dr. G. W. Martin
Williamsburg	Dr. J. P. Allen
Williamsport	Mr. Thos. Ferguson
Willoughby	Mr. James Maloney
Willshire	*Dr. C. W. Bobo
Wilmington	Dr. A. T. Quinn
Wilmot	Mr. O. Curtis Ricksecker
Winchester	*Dr. C. S. Corboy
Windham	Mr. H. J. Higley
Winton Place (Part of Cincinnati)..	
Woodsfield	Mr. A. S. Baker
Woodstock	Mr. Daniel S. Poling
Woodville	Dr. R. M. Durbin
Wooster	Dr. J. W. Lehr
Worthington	Mr. Bert Berrell
Wren	Mr. P. G. Havice
Wyoming	Mr. George Stoddard
Xenia	Dr. L. H. Brundage
Yellow Springs	Mr. Isaac Loe
Yorkshire	*Mr. George W. Hamilton
Youngstown	Dr. H. E. Welch
Zaleski	Mr. Sylvester Shry
Zanesville	Dr. Charles P. Sellers
Zanesfield	Dr. C. M. Wanzer
Zoar	*Mr. Charles J. Breymaier

ANNUAL REPORTS
LOCAL BOARDS OF HEALTH.

OHIO STATE BOARD OF HEALTH.

OFFICE OF THE SECRETARY.

COLUMBUS, O., December 15th, 1903.

To the Boards of Health and Health Officers:

DEAR SIRS:—The law requires local boards of health to make an Annual Report on or before the 15th day of January of each year to the State Board of Health. (See Section 2148, R. S.) These reports, under the amended law, are for the calendar year. We would like to have your report include the important features of the work of the board, or health officer where there is no board, during the year. What improvements, if any, have been made in the sanitary condition of your city or village. Have any new regulations been enforced as regards the milk supply, the collection of garbage, etc.? Have you encountered difficulties in enforcing the New Health Code, and if so, in what particular? Please state whether you have a hospital or pest-house to which smallpox patients may be removed. We would like to know from health officers appointed in lieu of a board of health, whether the new plan has been satisfactory. Suggestions for improving the health laws will be gladly received.

Please make out your report on pages 2 and 3, blank pages of this folder, and send it in, if possible, by January 15th, 1904, as we desire to include it in the Annual Report of the State Board of Health to the Governor.

Additional blanks will be sent if needed.

Very respectfully,

C. O. PROBST, M. D.,

Secretary.

By order of the Board.

ANNUAL REPORTS OF LOCAL BOARDS OF HEALTH.

ABERDEEN, BROWN COUNTY.

Person making report, S. A. Laughlin, M. D., health officer.

Health officer, S. A. Laughlin, M. D.

Clerk, W. H. Clark.

With the exception of the epidemic of variola here last spring, we have had but little sickness.

Cases of infectious diseases reported: Smallpox, 6; whooping cough, 3; total number of infectious diseases, 9.

ADA, HARDIN COUNTY.

Population, 3,200.

Person making report, W. H. Morrow, health officer.

Health officer, W. H. Morrow.

Clerk, W. H. Morrow.

Cases of infectious diseases reported: Smallpox, 3; scarlet fever, 10; typhoid fever, 5; total number of infectious diseases, 18.

ADDYSTON, HAMILTON COUNTY.

Person making report, J. B. Hannah, M. D., health officer.

Health officer, J. B. Hannah, M. D.

Previous to July 8, 1903, our department of health was a "board of health and a health officer," which had been very unsatisfactory to its constituency in its workings. Smallpox having been epidemic for months and continuing to spread so alarmingly as to attract the attention of the State Board, which threatened to take charge of our department. On July 8, 1903, the village council repealed and

enacted such ordinances as would place the department under the control of a "health officer" to be approved by the State Board of Health. When the change was made we had about 15 cases of smallpox and in very short time the number was increased to about 25, yet in two months the village was clear of the disease. Later we had 5 cases in one family but no spread. And for the last three months we have not had a case of smallpox and the department has been no expense to the village except salary of health officer and for disinfectants.

We have had isolated cases of diphtheria and scarlet fever, having had one death from each, but have had no spread of either; *no epidemic*.

The work of the department has been done with the least possible friction and I verily believe to the entire satisfaction of all interested.

No improvements in sanitary condition. Have no regulations as to milk supply.

We do not collect garbage but hope to in near future.

We have very little trouble in enforcing laws.

We have no hospital or pesthouse.

Cases of infectious diseases reported: Smallpox, 40; diphtheria, 6; scarlet fever, 6; typhoid fever, 15; measles, 2; total number of infectious diseases, 69.

AKRON, SUMMIT COUNTY.

Population, 50,000.

Person making report, A. A. Kohler, health officer.

Health officer, A. A. Kohler.

Clerk, George B. Corson.

We have encountered no difficulties in enforcing the new health code.

We have a substantial brick smallpox hospital situated on the outskirts of the city, easy of access. It will accommodate thirty patients.

The garbage is collected by a private company three times a week in the summer and twice a week in the winter.

Cases of infectious diseases reported: Smallpox, 78; diphtheria, 53; membranous croup, 8; scarlet fever, 72; typhoid fever, 54; whooping cough, 24; measles, 179; other infectious diseases, 7; total number of infectious diseases, 475.

ALLIANCE, STARK COUNTY.

Population, 10,000.

Person making report, P. W. Welker, M. D., health officer.

Health officer, P. W. Welker, M. D.
Clerk, A. W. Green.

Cases of infectious diseases reported: Smallpox, 28; diphtheria, 5; membranous croup, 1; scarlet fever, 29; total number of infectious diseases, 63.

ANSONIA, DARKE COUNTY.

Person making report, C. I. Stephens, health officer.

Health officer, C. I. Stephens.

Cases of infectious diseases reported: Scarlet fever, 7; typhoid fever, 4; whooping cough, 2; chickenpox, 4; total number of infectious diseases, 17.

APPLECREEK, WAYNE COUNTY.

Population, 428.

Person making report, W. H. Winkler, M. D. health officer.

Health officer, W. H. Winkler, M. D.
Clerk, J. R. Jameson, M. D.

Cases of infectious diseases reported: Diphtheria, 2; scarlet fever, 1; typhoid fever, 1; measles, 14; other infectious diseases, 3; total number of infectious diseases, 21.

ARCADIA, HANCOCK COUNTY.

Population, 500.

Person making report, W. W. Moore, health officer.

Health officer, W. W. Moore.

I will say that a health officer appointed in lieu of a board of health is satisfactory. We have no hospital or pesthouse to which smallpox patients may be removed.

Cases of infectious diseases reported: Typhoid fever, 3; measles, 15; other infectious diseases, 4; total number of infectious diseases, 22.

ARCANUM, DARKE COUNTY.

Population, 1,200.

Person making report, Dr. P. W. Byers, secretary of board of health.

Health officer, Dr. P. W. Byers.

Clerk, Dr. P. W. Byers.

Our town has been free from any epidemics the past year and the board of health has had very little to do but remove a few nuisances, in all about (63) sixty-three, principally privy vault cleaning. We have no pesthouse for smallpox, as we have been fortunate enough not to need any. The present system has been very satisfactory with us for what work we have had to do, just to keep our town clean.

Cases of infectious diseases reported: Scarlet fever, 1; typhoid fever, 6; total number of infectious diseases, 7.

ARCHBOLD, FULTON COUNTY.

Population, 1,000.

Person making report, August Ruihley, health officer.

Health officer, August Ruihley.

Clerk, August Ruihley.

There has not anything particular been done by the board for the past year nor was there much occasion for much work. Our milk supply is derived from about 40 or 50 different places. As this is a small village many a family owns their own cow. There is no system for the collection and disposal of garbage. The council has been asked to provide a garbage dump ground outside of village but so far has not provided any. We have no hospital or pesthouse for smallpox patients, nor do I know of a town of this size that has any.

Cases of infectious diseases reported: Scarlet fever, 2; whooping cough was epidemic here last summer.

ASHLEY, DELAWARE COUNTY.

Population, 738.

Person making report, M. B. McGonigle, M. D., health officer.

Health officer, M. B. McGonigle, M. D.

I have experienced no difficulty in enforcing the new health code and the only trouble to date has been in getting our physicians to report births and deaths, and contagious diseases as they are required to do.

We have no hospital or pesthouse. I believe the appointment of a health officer in lieu of a board of health has been satisfactory.

Cases of infectious diseases reported: Typhoid fever, 10; total number of infectious diseases, 10.

ASHLAND, ASHLAND COUNTY.

Population, 5,000.

Person making report, A. B. Newcomer, clerk.

Health officer, F. V. Dotterwick.

Clerk, A. B. Newcomer.

We have a splendid sewer system nearly completed. We have no hospital or pesthouse, but have made a move towards a pesthouse.

Everything is working nicely under the new code. We have a little trouble in getting some of our doctors to report. We must keep urging them up.

During the year there were 13 white male children, and 11 white female children born.

Cases of infectious diseases reported: Diphtheria, 2; typhoid fever, 3; whooping cough, 1; measles 15; total number of infectious diseases, 21.

ASHTABULA, ASHTABULA COUNTY.

Population, 15,000.

Person making report, Emory N. Campbell, clerk of board.

Health officer, A. W. Hopkins, M. D.

Clerk, Emory N. Campbell.

We have given an exclusive contract to one man (the lowest bidder) for gathering and removing wet garbage. Have adopted new plumbing and sanitary rules. Have no hospital or pesthouse to which smallpox patients can be removed.

Cases of infectious diseases reported: Smallpox, 3; diphtheria, 4; membranous croup, 4; scarlet fever, 7; total number of infectious diseases, 18.

ATHENS, ATHENS COUNTY.

Population, 3,500.

Person making report, W. A. Hibbard, secretary board of health.

Health officer, J. M. Higgins, M. D.

Clerk, W. A. Hibbard.

Cases of infectious diseases reported: Smallpox, 33; diphtheria, 4;

scarlet fever, 7; typhoid fever, 9; measles, 50; other infectious diseases, 153; total number of infectious diseases, 236.

ATTICA, SENECA COUNTY.

Population, 750.

Person making report, C. A. Force, health officer.

Health officer, C. A. Force.

Clerk, Ed. Gambee.

The health officer appointed in lieu of board of health has been very satisfactory indeed and has saved much time and trouble.

Cases of infectious diseases reported: Typhoid fever, 1; measles, 53; total number of infectious diseases, 54.

AVON, LORAIN COUNTY.

Population, 1,200.

Person making report, Jno. R. Pipes, health officer.

Health officer, Jno. R. Pipes.

Clerk, James Brooks.

No improvements in sanitary condition necessary excepting cleaning a few privy vaults. No difficulty experienced in enforcing laws. We have no hospital nor pesthouse. Special books with stubs and blanks for issuing burial permits should be used by health officers and a more rigid enforcement of this law followed out would be of benefit.

Cases of infectious diseases reported: Diphtheria, 2; typhoid fever, 3; measles, 2; other infectious diseases, 2; total number of infectious diseases, 9.

BAINBRIDGE, ROSS COUNTY.

Population, 1,000.

Person making report, R. H. McKee, health officer.

Health officer, R. H. McKee.

The village has established water works with an abundant supply of pure water which will no doubt improve the sanitary condition. No new regulations for milk supply or for the collection of garbage. New health code requirements have been enforced without trouble. Have no hospital or pesthouse. The health officer in lieu of board of health seems entirely satisfactory.

Cases of infectious diseases reported: Typhoid fever, 4; whooping cough, 4; total number of infectious diseases, 8.

BAKERSVILLE, COSHOCTON COUNTY.

Population, 200.

Person making report, J. D. Lower, health officer.

Health officer, J. D. Lower.

Clerk H. J. Bahnes.

Cases of infectious diseases reported: Typhoid fever, 4; total number of infectious diseases, 4.

BARBERTON, SUMMIT COUNTY.

Population, 7,000.

Person making report, W. A. Mansfield, M. D., health officer.

Health officer, W. A. Mansfield, M.D.

I served as health officer under a local board of health from April 2nd to August 24th when I was appointed health officer in lieu of a board of health. In September I passed a regulation making it unlawful for any person to throw garbage out of doors unless it be placed in a suitable receptacle. At same time I succeeded in getting a man to build a suitable garbage wagon and enter into the business of hauling garbage. He charges a reasonable fee to each person for taking away his garbage. The plan is

working well and our village is thus kept clean of such filth.

We have no pesthouse and quaranteen smallpox cases in their homes.

On April 2nd a smallpox epidemic visited our village, it continued 58 days. Number cases 29. Total cost to village \$1,200.00. Average cost for each case \$41. I conferred with the school board in November and they passed a regulation that no child can enter school unless he has been successfully vaccinated. I have done much to educate our people in the power of vaccination as a prevention against smallpox, and the school board is meeting with very little trouble in enforcing the regulation.

I have visited the schools and find them to be in good sanitary condition.

So far as I am able to judge I believe that a proper health officer in lieu of a health board can do more for the sanitation of a place this size or less (and do it quicker) than when the two are combined.

BARNESVILLE, BELMONT COUNTY.

Population, 4,000.

Person making report, D. O. Sheppard, M. D., health officer.

Health officer, D. O. Sheppard, M. D.
Clerk, Jas. Cassells.

In summing up the years work I find we have not much to report. We have harmony in the board and have had no epidemic to deal with. Outside of reorganization there has not been any departure from previous rulings. The sanitary condition is very good, yet we do not have a systematic method of removing garbage. Our milk supply is adequate and very good.

We have no pesthouse and the present notion is not favorable to that method. The quarantine laws are read-

ily enforced, but it seems difficult to enforce vaccination. And the prevalent form of smallpox they say is preferable to a sore arm. As to our water supply the village is planning to put in a water plant next year which we hope will be an improvement over the present wells.

Cases of infectious diseases reported: Smallpox, 2, scarlet fever, 5; measles, some few cases but not reported; total number of infectious diseases, 7.

BEAVER, PIKE COUNTY.

Population, 300.

Person making report, Jos. M. Swan, health officer.

Health officer, Jos. M. Swan.

There has been considerable sanitary improvement due to the collection of garbage. I have encountered some difficulty in the way of quarantine. Some have failed to observe the quarantine in case of scarlet fever.

We have no hospital or pesthouse.

I think the plan of a health officer in lieu of a board of health has been satisfactory.

There has been some comment and kicking about the hog having to leave the corporation. We have been somewhat lenient with them in the past but will draw the lines a little closer as the people get educated to it.

Cases of infectious diseases reported: Scarlet fever, 5; total number of infectious diseases, 5.

BEAVERDAM, ALLEN COUNTY.

Population, 600.

Person making report, J. B. Haines, health officer.

Health officer, J. B. Haines.
Clerk, Frank Huttinger.

Nothing new to report. No complaints as to the board of health action.

Cases of infectious diseases reported: Scarlet fever, 1; measles, 6; other infectious diseases, 1; total number of infectious diseases, 8.

BEDFORD, CUYAHOGA COUNTY.

Population, 2,000.

Person making report, Wm. F. Golling M. D., Sec'y. Health Board.

Health officer, Thos. E. Mathews.

Clerk, Wm. F. Golling.

Will say we are working under the new code and are in better shape now than we have been before. Are at this date having an epidemic of measles. We are keeping the town clean and are going to keep getting it cleaner all the time.

Our council have failed to provide for us a fit place as a dumping ground, but we think we can open their eyes pretty soon now. We have no regulations regarding the supply of milk.

We have no difficulty in enforcing the new health code.

We have no hospital or pesthouse, and should occasion demand we would have to seize any vacant house for quarantine or hospital purposes.

Cases of infectious diseases reported: Diphtheria, 1; scarlet fever, 3; typhoid fever, 3; measles, 18; total number of infectious diseases, 27.

BELLAIRE, BELMONT COUNTY.

Population, 10,000.

Person making report, D. W. Boone, health officer.

Health officer, D. W. Boone.

Clerk, D. W. Boone.

Cases of infectious diseases reported: Smallpox, 50; diphtheria, 4; membranous croup, 3; scarlet fever, 3; typhoid fever, 138; measles, 90; total number of infectious diseases, 283.

BELLE CENTER, LOGAN COUNTY.

Population, 1,200.

Person making report, J. F. Ewing, health officer.

Health officer, J. F. Ewing.

Clerk, Allen Sickles.

There has been no special improvement in our regulations. We require all garbage refuse to be hauled to the dumping ground which is located outside of the corporation limits. We have no regulation in regard to milk supplies, there being at present no dairies supplying milk, have had no difficulty in regard to new code, and as to hospital we have none, relying on condemnation process in case of necessity of a pest house being needed.

Cases of infectious diseases reported: Diphtheria, 1; total number of infectious diseases, 1.

BELOIT, MAHONING COUNTY.

Population, 350.

Person making report, R. R. Boyle, health officer.

Health officer, R. R. Boyle.

No improvement in the sanitary condition of the village has been made during the year. No new regulations have been enforced; and no difficulties encountered. There is no hospital or pesthouse in the village.

BELPRE, WASHINGTON COUNTY.

Population, 1,007.

Person making report, J. V. Athey, M. D., clerk.

Health officer, Joseph Sharp.

Clerk, J. V. Athey, M. D.

All contagious diseases have been strictly quarantined; quarantine has also been established on houses where exposure to smallpox was suspected or known to have occurred. Where houses were quarantined for diseases other than smallpox, those adults not

likely to have the disease were given permission to go about their usual vocations. No quarantine hospital has been maintained. Considerable vaccination has been done, the opposition to it being very slight.

The health officer has enforced cleaning up of cellars, pig pens, and water closets, etc.

The following births have been reported, 18 being male and 3 female, and of whom 20 were white and 1 was colored, making a total of 21. One physician refused to make a report.

Cases of infectious diseases reported: Smallpox, 2; diphtheria, 3; scarlet fever, 3; typhoid fever, 4; measles, 95; total number of infectious diseases, 107.

BEREA, CUYAHOGA COUNTY.

Population, about 3,000.

Person making report, T. L. McKean, clerk of board of health.

Clerk, T. L. McKean.

We have no hospital or pesthouse.

BERLIN HEIGHTS, ERIE COUNTY.

Population, 700.

Person making report, G. W. Hein, health officer.

Health officer, G. W. Hein.

Cases of infectious diseases reported: Diphtheria, 2; membranous croup, 1; measles, 125; total number of infectious diseases, 128.

BETHEL, CLERMONT COUNTY.

Population, 1,000.

Person making report, W. E. Thompson, M. D., health officer.

Health officer, W. E. Thompson, M. D.

Cases of infectious diseases reported: Smallpox, 5; scarlet fever, 2; total number of infectious diseases, 7.

BLAKESLEE, WILLIAMS COUNTY.

Population 239.

Person making report, J. A. Nichols, mayor.

Cases of infectious diseases reported: Scarlet fever, 2; total number of infectious diseases, 2.

BLANCHESTER, CLINTON COUNTY.

Population, 2,000.

Person making report, U. B. Chambers, health officer.

Health officer, U. B. Chambers.

There has been no special improvement in the sanitary condition of this village and at present this place is in a first class sanitary condition.

No new rules or regulation in the supply of milk or collection of garbage.

No difficulty in enforcing the health laws under the new code.

No hospital for smallpox patients.

The plan of a health officer in lieu of a Board of Health in this village has been so far successful and far more satisfactory and convenient.

I would suggest as a sanitary measure that the State Board of Health should not permit the construction of dry earth privies.

The school building is in good sanitary condition.

Cases of infectious diseases reported: Scarlet fever, 3; measles, 1; total number of infectious diseases, 4.

BLOOMDALE, WOOD COUNTY.

Population, 900.

Person making report, E. Wineland, health officer.

Health officer, E. Wineland.

No improvements. Nothing regarding milk supplies. No difficulty in enforcing the new health code. No hospital and no pesthouse. Health officer appointed in lieu of a board. The plan works satisfactory. The health law is gladly received.

Cases of infectious diseases reported: Scarlet fever, 1; total number of infectious diseases, 1.

BLOOMINGBURG, FAYETTE COUNTY.

Population about, 650.

Person making report, H. A. Pinkerton, health officer.

Health officer, H. A. Pinkerton.

Cases of infectious diseases reported: Typhoid fever, 2; whooping cough, 1; total number of infectious diseases, 3.

BLUFFTON, ALLEN COUNTY.

Population, 1,864.

Person making report, John J. Sutter, health officer.

Health officer, John J. Sutter.

Clerk, Sam. Steepleton.

The village is in a sanitary condition, no improvements have been made. The construction of a sewerage system would improve the sanitary condition much. We had no difficulty in enforcing the new health laws. The new plan is satisfactory. We have no pesthouse. One suggestion to improve health laws is that section 2128, the part speaking of people quarantined not able to pay for medical etc., etc., be paid by city, village, hamlet, etc., etc., shall be changed and read, be paid by city, or township in which etc., etc., for villages or hamlets have no poor or pauper fund; therefore it ought to come from the township where the fund is that the village pays its per

cent. of money for the support of its poor, all other poor funds are paid by township poor fund. Under new code, when a "pauper" is quarantined living in a village or hamlet, the expenses must be paid by village or hamlet. If not quarantined it is paid out of township or county (poor fund). I feel that my point is plain.

Cases of infectious diseases reported: Smallpox, 1; diphtheria, 7; membranous croup, 1; total number of infectious diseases, 9.

BOND HILL, HAMILTON COUNTY.

Population, 1,081.

Person making report, D. E. Murphy, ex-health officer.

Clerk, Dr. J. B. Kersey.

In regard to annual report of village of Bond Hill, Ohio, wish to inform you that the village was annexed to Cincinnati, Ohio, November, 1903.

The last meeting of the Health Board was held the first Saturday of September last, my term of office expired September 30, 1903. All books and reports were turned over to Dr. C. W. Davis, health officer, Cincinnati, Ohio. No change was made in board (referring to new code). The following were members of board: B. McDonald, P. R. Fortney, E. Wachendorf, H. Weruke, Dr. J. B. Kersey, E. F. Weiss, mayor, O. W. Bennett, attorney, Dr. J. B. Kersey, clerk, D. E. Murphy, health officer.

BOWERSTON, HARRISON COUNTY.

Population, 526.

Person making report, David Denny, health officer.

Health officer, David Denny.

Cases of infectious diseases reported: Scarlet fever, 1; measles, 4; total number of infectious diseases, 5.

Others not reported.

BOWLING GREEN, WOOD COUNTY.

Population, 5,500.

Person making report, Wm. Zimmerman, health officer.

Health officer, Wm. Zimmerman.

Clerk, Alex. Williamson.

Our city has not made any marked improvements in sanitary matters. A verdict against the town has just been secured for \$325.00 as damages arising from our famous Poe ditch of which you have some knowledge no doubt. We have no hospital or pesthouse for smallpox patients.

Cases of infectious diseases reported: Smallpox, 6; diphtheria, 40; membranous croup, 2; scarlet fever, 61; typhoid fever, 4; whooping cough, estimated 100; measles, 88; total number of infectious diseases, 301.

BRADNER, WOOD COUNTY.

Population, 1,200.

Person making report, O. J. Mitchell.

Health officer, O. J. Mitchell.

Health officer of the village of Bradner in lieu of a Board of Health. We find that this plan gives very good satisfaction so far. We have a garbage system by which we gather our garbage and dispose of it in a dumping ground.

We have made no new regulations in regards to the milk supply. I find no trouble in enforcing the new health code with the exception of receiving the death certificates from the undertakers, promptly.

We have no hospital or pesthouse to which smallpox patients could be removed.

Cases of infectious diseases reported: Typhoid fever, 1; total number of infectious diseases, 1.

BRIDGEPORT, BELMONT COUNTY.

Population, 4,482.

Person making report, V. Wagener, health officer.

Health officer, V. Wagener.

Clerk, L. C. Leech.

Cases of infectious diseases reported: Diphtheria, 46; membranous croup, 1; scarlet fever, 1; total number of infectious diseases, 48.

BRINKHAVEN, KNOX COUNTY.

Population, 400.

Person making report, J. T. Dewitt, mayor.

There is no Board of Health. Council will not assist in the appointment of a health officer, and the board has been appointed three separate times and will not serve without being recompensed for their time, and council thinks that we do not need the Board of Health, that they can attend to health matters themselves.

Cases of infectious diseases reported: Diphtheria, 1; whooping cough, 6; measles, 65; total number of infectious diseases, 72.

BROOKLYN, CUYAHOGA COUNTY.

Population, 4,000.

Person making report, Julius Renker, health officer.

Health officer, Julius Renker.

Clerk, John Fegie.

We have no pesthouse. Our streets are in fine shape. We have a good main sewer and some side streets are sewered, and next summer we intend to build more sewers. We got along finely this year, not one case of smallpox in 1903. Last year we had plenty of it.

Cases of infectious diseases reported: Diphtheria, 34; membranous croup, 4; scarlet fever, 3; typhoid fever, 16; whooping cough, 6; measles,

2; mumps, 3; total number of infectious diseases, 68.

BROOKVILLE, MONTGOMERY
COUNTY.

Population, 1,000.

Person making report, H. W. McMillen. health officer.

Health officer, H. W. McMillen.

Clerk, H. W. McMillen.

By request of board, council leased a place to dump garbage, and we have hired a man to gather same with very satisfactory results.

We have been unable to enforce our orders to clean privy vaults from the fact that we have been unable to find a man to do the work.

We have no hospital or pesthouse.

BROUGHTON, PAULDING COUNTY.

Population, 500.

Person making report, J. L. Baroff, marshal.

We have no infectious diseases to report for the year just ended. We have no hospital or pesthouse. Sanitary condition is good.

BRYAN, WILLIAMS COUNTY.

Population, near 4,000.

Person making report, N. Vineyard, health officer.

Health officer, N. Vineyard.

Clerk, N. Vineyard.

Our town is in a fair healthy condition, no cases of emergency to call our board of health together. All members hold over from year to year until tired and wish to retire. Our city council pays all bills promptly without a murmur. The streets, alleys and

back yards are thoroughly cleaned annually. Fine dairies, healthy cows, good pure milk and plenty of it. Choice fine meats in our markets as anywhere.

Cases of infectious diseases reported: Smallpox, 4; diphtheria, 1; scarlet fever, 7; typhoid fever, 3; whooping cough, all over town; measles, some few cases; total number of infectious diseases, 15.

BUCHTEL, ATHENS COUNTY.

Population, 1,200.

Person making report, A. K. Walker, M. D., health officer.

Health officer, A. K. Walker, M. D.

Clerk, John Maurer.

Cases of infectious diseases reported: Smallpox, 7; scarlet fever, 13; typhoid fever, 1; measles, 3; total number of infectious diseases, 24.

BUCYRUS, CRAWFORD COUNTY.

Population, 6,560.

Person making report, A. H. McCrory, health officer.

Health officer, A. H. McCrory.

Clerk, Charles Griffith.

No special improvements have been made in the sanitary condition of the city during the past year. No new regulations have been enforced as regard the milk supply or the collection of garbage. We have no pesthouse to which smallpox patients may be removed.

Cases of infectious diseases reported: Smallpox, 3; diphtheria, 1; membranous croup, 1; scarlet fever, 21; typhoid fever, 6; whooping cough, 3; measles, 4; other infectious diseases (varicella), 22; total number of infectious diseases, 61.

**BURKETSVILLE, DARKE AND
MERCER COUNTY.**

Population, 400.

Person making report, B. G. Inman,
M. D., health officer.

Health officer, B. G. Inman, M. D.
Clerk, Clifford Brown.

Our sanitary condition is well nigh perfect. Our system of drainage insures pure water and general cleanliness. We have no trouble in enforcing the law and have made but little change in the past year.

BUTLER, RICHLAND COUNTY.

Population, 800.

Person making report, E. G. Rummel, M. D., health officer.

Health officer, E. G. Rummel, M. D.

Board of Health was abolished May 4, 1903. I have not enforced new regulations in regard to milk or garbage. I have had no trouble with new code yet, but I expect I will have trouble in the spring to keep hogs outside of the village. We have no hospital or pesthouse. I have had no trouble enforcing the law since the board of health was abolished.

BYESVILLE, GUERNSEY COUNTY.

Population, 2,700.

Person making report, C. C. Large,
health officer.

Health officer, C. C. Large.

Clerk, M. R. Peters.

The new system is satisfactory as the old. We have had no smallpox yet nor have we any pesthouse. The village is in fair sanitary condition. There has been a great deal of vaccination performed during the past year.

Cases of infectious diseases reported: Scarlet fever, 12; total number of infectious diseases, 12.

CADIZ, HARRISON COUNTY.

Population, 2,000.

Person making report, Dr. S. B. McGavran, health officer.

Health officer, Dr. S. B. McGavran.

Cases of infectious diseases reported: Smallpox, 2; diphtheria, 2; scarlet fever, 1; typhoid fever, 1; total number of infectious diseases, 6.

CALDWELL, NOBLE COUNTY.

Population, 1,400.

Person making report, John Finley,
health officer.

Health officer, John Finley.

Clerk, R. Summers.

Cases of infectious diseases reported: Typhoid fever, 1; total number of infectious diseases, 1.

CALEDONIA, MARION COUNTY.

Population, 750.

Person making report, Noah Lee,
health officer.

Health officer, Noah Lee.

Clerk, M. H. Underwood.

The sanitary condition of our village is good. Have made no improvements during the year. We have no milk market. The streets are scraped in early spring. Garbage and droppings are hauled off. Night-soil is buried as often as it may be necessary from privies and outhouses. We have no difficulty in enforcing the new code. Have no pesthouse—have had no use for one.

Cases of infectious diseases reported: Smallpox, 2; total number of infectious diseases, 2.

CAMBRIDGE, GUERNSEY COUNTY.

Population, 11,000.

Person making report, Thos. C. Stanley, health officer.

Health officer, Thos. C. Stanley.

Clerk, T. C. Stanley.

Every precaution has been taken to keep the city in sanitary condition, but have been somewhat handicapped by rules under the new code, for lack of funds.

I have no trouble with the milk venders, and garbage is collected by men who follow the business of collecting the same.

Have had no trouble enforcing the law under the new code. Have no hospital or pesthouse. From my experience I would suggest that there be some special legislation to compel heads of families to report contagious diseases to physicians or health department. I have found 94 cases of smallpox in a light form, and I am confident there has been half that many cases that have been concealed, and not reported to a physician or the health board, for fear of being quarantined. Therefore, it has made it very hard to stamp out. If heads of families could be fined or imprisoned for neglecting to report same to physicians or health department, we would have less trouble in stamping out same.

Cases of infectious diseases reported: Smallpox, 102; diphtheria, 5; membranous croup, 1; scarlet fever, 9; typhoid fever, 4; measles, 143; other infectious diseases, 17; total number of infectious diseases, 281.

CAMDEN, PREBLE COUNTY.

Population, 1,000.

Person making report, Wm. E. Pryor, M. D., health officer.

Health officer, Wm. E. Pryor, M. D.
Clerk, H. C. Crafton.

This place is in a fair sanitary condition. Streets and alleys are kept quite clean, as well as private property. Nothing has been done as re-

gards milk supply and collection of garbage. Have had a few cases of diphtheria, but by enforcing quarantine laws have it under control.

We have no pesthouse for smallpox patients.

Cases of infectious diseases reported: Diphtheria, 5; typhoid fever, 7; whooping cough, 1; total number of infectious diseases, 13.

CANAL DOVER, TUSCARAWAS COUNTY.

Population, 5,422.

Person making report, T. H. Brannan, health officer.

Health officer, T. H. Brannan.

Clerk, Jacob Klar.

An effort is now on foot to get our local board of health organized for a reliable business and by another year we hope to render better service and better report.

Cases of infectious diseases reported: Smallpox, 6; diphtheria, 3; scarlet fever, 3; typhoid fever, 1; measles, 4; total number of infectious diseases, 17.

CANAL FULTON, STARK COUNTY.

Population, 1,170.

Person making report, Wm. Logan, health officer.

Health officer, Wm. Logan.

Clerk, D. K. Jones.

There have been great improvements in the sanitary conditions of our town in the past year. The milk supply is looked after by M. C. Shafer, druggist and food inspector. No difficulties with the new health code. We have no hospital or pesthouse. We have a dumping ground for garbage that is not filthy and all filth we buried. We have had no infectious diseases in our town.

CANTON, STARK COUNTY.

Population, 40,000.

Person making report, J. F. Marchand, M. D., health officer.

Health officer, J. F. Marchand, M. D.
Clerk, J. F. Marchand, M. D.

Cases of infectious diseases reported: Smallpox, 84; diphtheria, 68; scarlet fever, 72; total number of infectious diseases, 224.

CAREY, WYANDOT COUNTY.

Population, 2,000.

Person making report, R. C. Van Buren, health officer.

Health officer, R. C. Van Buren.

We have only a health officer. I find that it is more satisfactory in general than to have a board. Nothing in particular has been done in any special manner. I visit the stables of our dairymen every week or so to see their condition, etc. There is one trouble, we have no money for taking care of our quarantined patients, the council trying to turn them over to the township and they in turn to the county, and by the time all this is done the patient is better and no one pays the bills.

Cases of infectious diseases reported: Smallpox, 4; diphtheria, 2; typhoid fever, 1; measles, 3; total number of infectious diseases, 10.

CARTHAGE, HAMILTON COUNTY.

Population, 2,900.

Person making report, F. S. Staaf, health officer.

Health officer, F. S. Staaf.

Clerk, F. S. Staaf.

Money expended during the year, \$154.52.

The health officer transacts all of the business governed by the State Board of Health, and reports to the

village council. The village has its own garbage wagons. I have found no difficulties in enforcing the new health code. We have no pesthouse. The new plan so far has been very satisfactory. Twenty-two nuisances were reported during the year and all were abated. Forty-seven births were recorded.

Cases of infectious diseases reported: Diphtheria, 1; typhoid fever, 2; measles, 3; total number of infectious diseases, 6.

CASSTOWN, MIAMI COUNTY.

Population, 300.

Person making report, W. W. Baker, M. D., health officer.

Health officer, W. W. Baker, M. D.

Cases of infectious diseases reported: Smallpox, 5; typhoid fever, 1; total number of infectious diseases, 6.

CECIL, PAULDING COUNTY.

Population, 326.

Person making report, S. E. DeMuth, health officer.

Health officer, S. E. DeMuth.

Clerk, C. R. Weaver.

All cases of typhoid fever, except one, were traced to an infected milk supply.

Cases of infectious diseases reported: Diphtheria, 10; typhoid fever, 14; total number of infectious diseases, 24.

CEDARVILLE, GREENE COUNTY.

Population, 1,178.

Person making report, M. H. Shroads, health officer.

Health officer, M. H. Shroads.

Clerk, J. M. Bromagene.

We have two dumps, one for garbage and one for filth, which has to be buried.

The board has made no new regulations as yet in regard to milk supply, as our dairymen give good milk to patrons.

Have had no difficulties in particular with new code. We give the people the law straight and tell them it must be complied with, or be enforced. We have no pesthouse or hospital as yet.

Cases of infectious diseases reported: Diphtheria, 1; membranous croup, 1; whooping cough, 3; measles, 1; ; total number of infectious diseases, 6.

CELINA, MERCER COUNTY.

Population, 3,200.

Person making report, Joseph Sager, health officer.

Health officer, Joseph Sager.

Clerk, L. D. Brum.

Cases of infectious diseases reported: Diphtheria, 8; scarlet fever, 14; typhoid fever, 8; measles, 24; other infectious diseases 2; total number of infectious diseases, 56.

CENTERVILLE, MONTGOMERY COUNTY.

Population, 250.

Person making report, D. Keever, health officer.

Health officer, D. Keever.

No improvement has been made in the sanitary condition of this village. We are situated on one of the highest points between Dayton and Cincinnati, and the sanitary condition, drainage, etc., are excellent. The milk we obtain from private families, and I have experienced no trouble from impure milk or in the disposal of garbage. It has not been necessary to enforce the new health code. We have no hospital or pesthouse.

Cases of infectious diseases reported: Smallpox, 1; typhoid fever, 1; total number of infectious diseases, 2.

CHAGRIN FALLS, CUYAHOGA COUNTY.

Population, 1,700.

Person making report, E. E. Nichols, clerk.

Health officer, W. J. Clark.

Clerk, E. E. Nichols.

Cases of infectious diseases reported: Scarlet fever, 1; typhoid fever, 2; whooping cough, 10; measles, 4; other infectious diseases, 6; total number of infectious diseases, 23.

CHARDON, GEauga COUNTY.

Population, 1,650.

Person making report, P. F. Walthous, health officer.

Health officer, P. F. Walthous.

Clerk, M. L. Maynard.

The new system is very satisfactory, and as soon as everyone becomes familiar with same things will work "O. K."

Cases of infectious diseases reported: Diphtheria, 1; scarlet fever, 1; typhoid fever, 2; measles, 2; total number of infectious diseases, 6.

CHEVIOT, HAMILTON COUNTY.

Population, 800.

Person making report, George B. Tait, health officer.

Health officer, George B. Tait.

The sanitary condition of the village is greatly improved. One of the worst features to overcome was privies, which for years had received no attention. Most of them were surface privies and were liable to overflow. During the past season the health officer has abated 21 of such, and after thorough cleaning caused boxes to be placed therein. An ordinance of the village requires a vault to be built whenever a new improvement is made, and permits have been issued for 12

of such. All nuisances arising from hog pens have been abated, owners being compelled to keep their pens clean and properly deodorized. We have no regulations for the removal of garbage. Some of the people burn their garbage, others feed it to hogs, and some remove it with manure. On the whole, the streets and alleys are free from any accumulation of garbage or other refuse.

The milk supply is pretty generally furnished by private parties, or people keep their own cows, and, as a rule, the supply is pure.

There has been no difficulty in enforcing the new code, and residents appear to be satisfied to obey the orders of the health officer.

The village has no hospital or pesthouse, and no place to isolate a case of smallpox.

The new plan has proved satisfactory.

Cases of infectious diseases reported: Scarlet fever, 1; typhoid fever, 1; total number of infectious diseases, 2.

CHILLICOTHE, ROSS COUNTY.

Population, 16,000.

Person making report, W. S. Scott, health officer.

Health officer, W. S. Scott.

Clerk, Jas. I. Boulger.

Two squares of additional sanitary sewer have been added to the one already built, and the specifications for a new sewer, which is to take in the resident part of the city, are now drawn up. The general sanitary condition of the city is good, with the exception of a few catch basins, which have no outlet or connection with sewers.

The board of public service is about to inaugurate a new method of street sweeping which will be an improvement—hand sweepers and carts. No new regulations have been enforced

in regard to the milk supply and the garbage collection.

The new health code seems to be satisfactory.

The city has a pesthouse which is not in condition to receive smallpox patients.

Cases of infectious diseases reported: Smallpox, 26; diphtheria, 9; scarlet fever, 16; typhoid fever, not reported, very few during 1903; measles, 18; total number of infectious diseases, 69.

CINCINNATI, HAMILTON COUNTY.

Person making report E. Walter Evans, registrar of vital statistics.

Health officer, Clark W. Davis, M. D.

Cases of infectious diseases reported: Smallpox, 325; diphtheria and membranous croup, 436; scarlet fever, 523; typhoid fever, 750; whooping cough, 194; measles, 1,316; other infectious diseases, 990; total number of infectious diseases, 4,534.

CIRCLEVILLE, PICKAWAY COUNTY.

Population, 7,000.

Person making report, W. H. Dunkel, Health officer, W. H. Dunkel.

Clerk, W. H. Dunkel.

I would say we have no pesthouse to which we could move smallpox patients. We have had very little trouble in 1903 except in smallpox cases.

Cases of infectious diseases reported: Smallpox, 10; scarlet fever, 1; typhoid fever, 21; measles, 31; total number of infectious diseases, 63.

CLARINGTON, MONROE COUNTY.

Population, 906.

Person making report, T. S. Strickling, clerk of board of health

Health officer, C. T. Reilly.
Clerk, T. S. Strickling.

Cases of infectious diseases reported: Typhoid fever, 1; total number of infectious diseases, 1.

CLARKSVILLE, CLINTON COUNTY.

Population, 600.

Person making report, Luther Snook, health officer.

Health officer, Luther Snook.

Under the new regime of health officer instead of a health board there is no cause for complaint. Our town, which usually has several cases of typhoid fever each fall, was lucky in having but one case. Our sanitary officer, Mr. Geo. Bradfield, has kept the streets and alleys as clean as possible. Outside of one case of membranous croup, which was fatal and which necessitated the strictest measures, our town has been lucky indeed. We have no pesthouse. We are looking seriously in the eye the problem of the best means to get rid of our garbage, no measures ever having been taken here to get rid of the same other than by individual request. So far that has answered the purpose. Well backed up by the town council we have had no difficulty in enforcing the laws of the State Board of Health. Our school house and outbuildings are in a good sanitary condition. The milk and meat supply are, in our judgment, of the best.

Cases of infectious diseases reported: membranous croup, 1; total number of infectious diseases, 1.

CLEVELAND HEIGHTS, CUYAHOGA COUNTY.

Person making report, Wm. E. Shackleton, health officer.

Health officer, Wm. E. Shackleton.

The sanitary condition of the village of Cleveland Heights is, as a whole,

but fair. That part of the village included in Euclid Heights has an adequate sewer system emptying into the Cleveland system, and the health officer is informed that that portion of the village known as Mayfield Heights has completed arrangements for sewerage and proper disposition of the sewage in the near future.

In two instances defective and overflowing privy vaults, menacing the health of those in the vicinity, were disinfected and cement vaults ordered constructed, which instructions were carried out. There is at present a local system sufficient for the needs of a large portion of the community, and when the larger and more complete system contemplated shall have been secured the entire more thickly populated portions of the village may be placed in perfect sanitary condition.

There are no new regulations governing the milk supply or the collection of garbage.

Difficulty is constantly being encountered in obtaining physicians' reports, and that fact renders this report very incomplete. The most flagrant neglect in this respect being a failure to report diphtheria. It was only when a death occurred and fumigation was asked for that the case became known. Investigation revealed two new cases in the same family, and a quarantine was established immediately. No new cases developed.

In this connection may be mentioned the only case of typhoid fever reported; illustrating the wisdom and desirability of compelling physicians to report infectious and contagious diseases. The case was reported as soon as recognized and immediate investigation developed that it was at a reservoir from which seventy or more families received their water supply, with every probability that the water might become contaminated. Proper precautions were at once observed and no new cases resulted.

The village has no hospital or pesthouse, but an understanding exists

that the Cleveland authorities will care for smallpox cases at their institution maintained for that purpose.

So far as known there has been no dissatisfaction with the present plan of conducting the health department.

Cases of infectious diseases reported: Diphtheria, 2; typhoid fever, 1; total number of infectious diseases, 3.

CLEVES, HAMILTON COUNTY.

Population, 1,800.

Person making report, W. C. Hughes, M. D., health officer.

Health officer, W. C. Hughes, M. D. Clerk, Wilber Gwaltney.

Cases of infectious diseases reported: Smallpox, 1; diphtheria, 4; scarlet fever, 2; measles, 4; total number of infectious diseases, 11.

CLYDE, SANDUSKY COUNTY.

Population, 3,000.

Person making report, F. G. Tuttle, health officer.

Health officer, F. G. Tuttle.

Clerk, W. T. Mann.

Cases of infectious diseases reported: Scarlet fever, 15; typhoid fever, 2; chicken pox, 5; measles, 8; total number of infectious diseases, 30.

COALTON, JACKSON COUNTY.

Population, 1,500.

Person making report, J. C. Duncan, health officer.

Health officer, J. C. Duncan.

We have no hospital or pesthouse.

Cases of infectious diseases reported: Typhoid fever, 2; total number of infectious diseases, 2.

COLLINWOOD, CUYAHOGA COUNTY.

Population, 6,000.

Person making report, Dr. W. H. Williams, health officer.

Health officer, Dr. W. H. Williams.

The village of Collinwood is in excellent condition as regards health of the community. Considering the lack of proper sanitation—no sewers, the use of natural water course and ditches for drainage—the health department feels it has done efficient work in maintaining a good standard of health for the town. Many violations of the sanitary code were discovered and corrected. Stagnant pools and abandoned wells were ordered filled. We found disposal of night soil, from the Amusement Park, on the Lake shore, frequented by thousands from Cleveland, was a menace to them and ourselves, the sludge collecting in cesspools and allowing overflow to flow to beach, creating a constant pollution of water, which is but little affected by any currents. Great numbers indulged in bathing here, which is probably one of the etiological factors in the typhoid epidemic in Cleveland during the past summer. Above system has been ordered discontinued.

Strangely enough, though using water from Cleveland mains, we escaped any increase in typhoid rate, as compared with previous years. Our improvements, under way, embrace a system of sewerage to cover the whole village. The combined system will be used, with outlet into the Cleveland interceptor, and separate outlet for that portion too low to get fall into the big sewer. We feel the large number of scarlet fever cases reported is directly traceable to lack of moral courage on part of attending physician, whose duty it is to report such cases for quarantine, many light cases not being reported, especially if quarantine does not meet with approval by the household. Eliminating the board and making the health officer responsible

has facilitated many cases that would have to wait for meeting of board, and further removes the office from politics, with its obstructive legislating, as so often occurs in local boards of health.

Cases of infectious diseases reported: Diphtheria, 31; scarlet fever, 81; typhoid fever, 10; whooping cough, 9; measles, 2; other infectious diseases, 10; total number of infectious diseases, 143.

COLUMBIANA, COLUMBIANA COUNTY.

Population, 1,850.

Person making report, Geo. Roninger, health officer.

Health officer, George Roninger.

Mayor, Bert Renkenberger.

The sanitary condition of our town is the same as the previous year—everything is in good condition, no particular improvements have been made. No new regulations have been enforced as regards the milk supply. We have two milk men who sell milk in town every day, and as far as known their milk is in a healthy condition. The garbage is all taken away and disposed of in the usual manner as in previous years. We have no hospital or pesthouse to which smallpox patients may be removed, although so far we have had no smallpox in our town.

Cases of infectious diseases reported: Scarlet fever, 3; typhoid fever, 9; whooping cough, 14; measles, 1; total number of infectious diseases, 27.

COLUMBUS, FRANKLIN COUNTY.

Estimated population, 160,000.

Person making report, Dr. McKendree Smith, health officer.

Health officer, Dr. McKendree Smith.

Clerk, E. A. Moriarty.

Cases of infectious diseases reported: Smallpox, 382; diphtheria and membranous croup, 60; scarlet fever, 408; typhoid fever, 195; whooping cough, 62; measles, 701; total number of infectious diseases, 1,808.

COLUMBUS GROVE, PUTNAM COUNTY.

Population, 2,000.

Person making report, J. F. Bogart, health officer.

Health officer, J. F. Bogart.

Cases of infectious diseases reported: Smallpox, 18; membranous croup, 2; typhoid fever, 14; whooping cough, 28; measles, 165; total number of infectious diseases, 227.

COMMERCIAL POINT, PICKAWAY COUNTY.

Population, 260.

Person making report, J. G. Watkins, mayor.

Cases of infectious diseases reported: Smallpox, 5; scarlet fever, 3; typhoid fever, 5; whooping cough, 5; total number of infectious diseases, 18.

CONGRESS, WAYNE COUNTY.

Population, 198.

Person making report, Geo. C. Essick, M. D., health officer.

Health officer, Geo. C. Essick, M. D. Clerk, C. A. Weiler.

We have found no difficulty in enforcing the new health code. We have no pesthouse for smallpox patients. The new plan has been entirely satisfactory.

Cases of infectious diseases reported: Whooping cough, 30; measles, 1; total number of infectious diseases, 31.

CONNEAUT, ASHTABULA COUNTY.

Population, 8,000.

Person making report, O. N. Warner, health officer.

Health officer, O. N. Warner.

Clerk, E. C. Thayer.

We have no pesthouse.

Cases of infectious diseases reported: Smallpox, 1; diphtheria, 8; membranous croup, 1; scarlet fever, 1; typhoid fever, 17; measles, 2; total number of infectious diseases, 30.

CONTINENTAL, PUTNAM COUNTY.

Population, 1,400.

Person making report, Wm. Saegers, health officer.

Health officer, Wm. Saegers.

No improvements, with the exception that weed cutting and garbage cleaning has been kept up better than ever before. In regard to the new code I have done everything in my power to enforce it. No pesthouse or hospital.

Cases of infectious diseases reported: Smallpox, 4; total number of infectious diseases, 4.

CONVOY, VAN WERT COUNTY.

Population, 800.

Person making report, C. D. Sidle, health officer.

Health officer, C. D. Sidle.

The sanitary condition of our village is very good. No improvements have been made in the last year. There have not been any new regulations concerning milk supply or garbage enforced. Have not had any difficulty in enforcing quarantine. We have neither hospital nor pesthouse. The new plan has been satisfactory.

Cases of infectious diseases reported: Membranous croup, 1; total number of infectious diseases, 1.

CORNING, PERRY COUNTY.

Population, 1,460.

Person making report, Wm. Anderson, health officer.

Health officer, William Anderson.

Clerk, David Mason.

Cases of infectious diseases reported: Scarlet fever, 3; typhoid fever, 2; whooping cough, 16; measles, 100; total number of infectious diseases, 121.

COSHOCOTON, COSHOCTON COUNTY.

Population, 8,000.

Person making report, J. E. Foster, health officer.

Health officer, J. E. Foster.

Clerk, W. M. Smith.

Our city has not improved much in a sanitary way. Water mains and sewers have been extended and streets have been paved. No new rules have been enforced as regards milk supply, etc. Have encountered no difficulty in enforcing the new health code. We have no pesthouse or isolation hospital.

Cases of infectious diseases reported: Smallpox, 15; diphtheria, 2; scarlet fever, 97; typhoid fever, 27; whooping cough, 14; measles, 317; other infectious diseases, 8; total number of infectious diseases, 480.

COVINGTON, MIAMI COUNTY.

Population, 2,000.

Person making report, Dr. R. M. Shellabarger, health officer.

Health officer, Dr. R. M. Shellabarger.

Clerk, W. E. Westfall.

Cases of infectious diseases reported: Membranous croup, 1; total number of infectious diseases, 1.

CRESTLINE, CRAWFORD COUNTY.

Population, 4,000.

Person making report, C. A. Marquart, health officer.

Health officer, C. A. Marquart.

Clerk, Jas. Gasser.

Cases of infectious diseases reported: Smallpox, 6; diphtheria, 2; scarlet fever, 1; measles, 9; total number of infectious diseases, 18.

CUSTAR, WOOD COUNTY.

Population, 325.

Person making report, Edward France, health officer.

Health officer, Edward France.

Cases of infectious diseases reported: Typhoid fever, 3; other infectious diseases, 1; total number of infectious diseases, 4.

CRESTON, WAYNE COUNTY.

Population, 900.

Person making report, C. A. Mellen, health officer.

Health officer, C. A. Mellen.

Cases of infectious diseases reported: Diphtheria, 6; measles, 25; total number of infectious diseases, 31.

CUYAHOGA FALLS, SUMMIT COUNTY.

Population, 3,200.

Person making report, W. W. Scupholm, health officer.

Health officer, W. W. Scupholm.

Cases of infectious diseases reported: Smallpox, 3; diphtheria, 4; measles, 3; total number of infectious diseases, 10.

CROTON, LICKING COUNTY.

Population, 400.

Person making report, S. S. Reynolds, M. D., health officer.

Health officer, S. S. Reynolds, M. D.

Clerk, E. E. Shafer.

Cases of infectious diseases reported: Scarlet fever, 2; total number of infectious diseases, 2.

DALTON, WAYNE COUNTY.

Population, 666.

Person making report, F. F. H. Pope, M. D., health officer.

Health officer, F. F. H. Pope, M. D.

My report must of necessity be very meager, as I was not authorized to act until July. However, it would be very circumscribed at best. The council refuses to set apart any money for the health department, and I am only ornamental, or supposed to be. I have been endeavoring to have some sewers put in, but to no effect. We have annual visitations of typhoid fever as a result of the flooding of the flats, from the privies, pig pens and stables on the hillsides.

Cases of infectious diseases reported: Typhoid fever, 1; total number of infectious diseases, 1.

CROWN CITY, GALLIA COUNTY.

Population, 300.

Person making report, J. V. Stevers, health officer.

Health officer, J. V. Stevers.

Clerk, W. S. Haskins.

Cases of infectious diseases, reported: Typhoid fever, 1; whooping cough, 10; measles, 25; total number of infectious diseases, 36.

DAYTON, MONTGOMERY COUNTY.

Population, 95,000.

Person making report, Nelson Emmons, Sr., clerk.

Health officer, C. W. King, M. D.

Clerk, Nelson Emmons, Sr.

An order was adopted in February, 1903, by our board, to prevent the killing of diseased animals for food in our city. An order regulating the sale of milk has recently been adopted. Our board of public service retains the control of the garbage of our city.

During the year free vaccination was offered to all who chose to avail themselves of it. This resulted in a little more than six thousand five hundred (6,500) free vaccinations. We have at present but one case of smallpox in our city outside of the workhouse. The sanitary condition of our city is being improved by extension of the sanitary sewer system, and is at present excellent. We have a pesthouse, situated about one mile below the corporation line, where all smallpox patients can be removed and receive excellent care by H. J. Butz and wife, who are fine nurses, very capable and efficient. For the last three years these patients have been attended by E. A. Stewart, M. D., a most competent physician in such cases.

Cases of infectious diseases reported: Smallpox, 110; diphtheria, 42; membranous croup, 2; scarlet fever, 68; typhoid fever, 49; whooping cough, 5; measles, 19; other infectious diseases, 57; total number of infectious diseases, 352.

Cases of infectious diseases reported: Diphtheria, 3; measles, 1; total number of infectious diseases, 4.

DELAWARE, DELAWARE COUNTY.

Population, 9,000.

Person making report, O. W. Bonner, health officer.

Health officer, O. W. Bonner.

Clerk, O. W. Bonner.

We have a new system of sanitary sewerage which extends to nearly all parts of the city, and also a disposal plant, and we are glad to say that many are connecting up with the same. We expect to make war on people now whose closets are connected with natural waterways and drains leading to the river. In my opinion, the milk supply is not looked after as carefully as should be, as we have no inspector. The garbage is looked after and collected daily. We have not as yet met with any difficulty in enforcing the new health code. We have arranged for a pesthouse, but are thankful to say we are free from smallpox this winter. We have not had a case here since last June.

Cases of infectious diseases reported: Smallpox, 15; diphtheria, 4; membranous croup, 1; scarlet fever, 20; typhoid fever, 14; whooping cough, 18; measles, 30; other infectious diseases, 12; total number of infectious diseases, 114.

DE GRAFF, LOGAN COUNTY.

Population, 1,250.

Person making report, Roy H. Ross, clerk of board of health.

Health officer, A. J. McElroy.

Clerk, Roy H. Ross.

The health of the community seems to be good. We have no hospital or pesthouse.

DELPHOS, ALLEN AND VAN WERT COUNTIES.

Population, 4,500.

Person making report, N. E. Brundage, health officer.

Health officer, N. E. Brundage.

Clerk, N. E. Brundage.

We have had no difficulty in enforcing the new code as yet. There have not been any new improvements in the

sanitary conditions in the past several years, except to vote on sanitary sewerage, which carried, but for the want of funds there has nothing been done. We have neither hospital nor pesthouse in our village.

Cases of infectious diseases reported: Scarlet fever, 12; typhoid fever, 4; whooping cough, 2; measles, 28; total number of infectious diseases, 46.

DELTA, FULTON COUNTY.

Population, 1,400.

Person making report, J. A. Grandy, clerk.

Health officer, Dr. William Ramsey.
Clerk, J. A. Grandy.

Cases of infectious diseases reported: Scarlet fever, 19; total number of infectious diseases, 19.

DENNISON, TUSCARAWAS COUNTY.

Population, 4,000.

Person making report, L. H. Hughes, M. D., health officer.

Health officer, L. H. Hughes, M. D.
Clerk, C. F. Gossett.

Sanitary condition of town same as formerly. No new regulations in regard to garbage, etc. No difficulties in enforcing new health code. No hospital or pesthouse for smallpox patients. New plan has been satisfactory.

Cases of infectious diseases reported: Smallpox, 17; diphtheria, 7; scarlet fever, 15; total number of infectious diseases, 39.

DESHLER, HENRY COUNTY.

Population, 2,200.

Person making report, J. E. Robinson, ex-health officer.

Cases of infectious diseases reported: Smallpox, 2; diphtheria, 8; scarlet fever, 5; typhoid fever, 35; whooping cough, 20; measles, 12; total number of infectious diseases, 82.

DILLONVALE JEFFERSON COUNTY.

Population, 1,950.

Person making report, Ross Blazer, health officer.

Health officer, Ross Blazer.

There have been improvements made in the sanitary conditions by ditching. There have been no new regulations enforced as regards the milk supply or the collection of garbage. There is no hospital or pesthouse for smallpox patients. We think the new plan of appointing a health officer in lieu of a board of health has been satisfactory at this place.

Cases of infectious diseases reported: Membranous croup, 1; scarlet fever, 28; typhoid fever, 20; measles, 159; total number of infectious diseases, 208.

DRESDEN, MUSKINGUM COUNTY.

Population, 1,600.

Person making report, C. W. Carter, health officer.

Health officer, C. W. Carter.
Clerk, S. B. Taylor.

There have not been any regulations made in regard to the milk supply. We enforce strict regulations for collection of garbage and cleaning up of yards. Have no trouble in enforcing the new code law. It gives good satisfaction. Have no pesthouse.

Cases of infectious diseases reported: Smallpox, 5; diphtheria, 9; scarlet fever, 11; total number of infectious diseases, 25.

DUNKIRK, HARDIN COUNTY.

Population, 1,300.

Person making report, C. C. McLaughlin, M. D., health officer.

Health officer, C. C. McLaughlin, M. D.

Clerk, Jesse Kinsey.

The number of nuisances ordered abated was between twenty-five and thirty, and in every instance the work was done as soon as ordered. The sanitary condition of the village at the present time is the best it has ever been. We have had less trouble in sanitary affairs since the board of health was abolished than heretofore.

Cases of infectious diseases reported: None.

DUPONT, PUTNAM COUNTY.

Population, 500.

Person making report, H. P. Senger, health officer.

Health officer, H. P. Senger.

Clerk, M. Ferguson.

There has been no improvement made in the sanitary condition of the village. No new regulations as to the milk supply, or collection of garbage, etc. No difficulty in enforcing the new health code. Have no hospital or pest-house at present.

Cases of infectious diseases reported: Whooping cough, 10; measles, 20; total number of infectious diseases, 30.

EAST CLEVELAND, CUYAHOGA COUNTY.

Population, estimated 6,000.

Person making report, J. H. Stamberger, health officer.

Health officer, J. H. Stamberger.

Clerk, J. M. Waugh, M. D.

Cases of infectious diseases reported: Diphtheria, 4; scarlet fever, 2;

typhoid fever, 2; measles, 1; total number of infectious diseases, 9.

EAST LIVERPOOL, COLUMBIANA COUNTY.

Population (census of 1900), 16,485.

Person making report, Dr. C. B. Ogden, health officer.

Health officer, Dr. C. B. Ogden.

Clerk, J. T. Herbert.

We have no pesthouse to which smallpox patients can be taken, but during the year have discussed the advisability of building one should smallpox become epidemic. Our cases have all been confined to the houses in which they started and in no case has the disease been permitted to spread. The 18 cases were all handled at an average of less than \$200 per case. During the year we passed a resolution regulating the sale of milk in the city and charging milk dealers \$1.00 per year. The collections in July amounted to \$19.50. As our milk dealers are located so far out in the country and this amount will in no way pay for an inspection which the law calls for, the dealers have not been paying the license in January. The matter will probably be allowed to rest until the Board of Health has sufficient funds at its command to make a thorough inspection. In the meantime the health officer as far as possible sees that the dairies are kept in good condition. The board recommended to the council that they at once instruct the Board of Service to take steps to construct a sewer in the second district of the city which will materially improve the sanitary condition of that part of the city. As regards the new code we have had no trouble in enforcing the law.

Cases of infectious diseases reported: Smallpox, 18; diphtheria, 14; membranous croup, 2; scarlet fever, 35; typhoid fever, 35; measles, 44;

chicken pox, 13; total number of infectious diseases, 161.

EAST PALESTINE, COLUMBIANA COUNTY.

Population, 3,000.

Person making report, Levi Neville, health officer.

Health officer, Levi Neville.

Clerk, L. Neville.

Sanitary condition is good. No nuisances but what we have abated. Night soil and garbage are taken out of the city limits and dispensed with. Contagious diseases are not properly reported, but a record is kept of such diseases as: diphtheria and measles. Have had seven meetings during the year. Expenses for the year \$53.50. The board has taken every precaution for the sanitary condition of our town. The town put down 3-4 of a mile of brick pavement and two lines of 24-inch sewers and a number of minor improvements for the benefit of the city. One of the milk dealers was fined for selling adulterated milk. We have had no difficulty in enforcing the new health code. We have no hospital or pesthouse for removing small-pox patients.

Cases of infectious diseases reported: Diphtheria, 1; typhoid fever, 2; measles, 50; total number of infectious diseases, 53.

EATON, PREBLE COUNTY.

Population, 3,150.

Person making report, J. C. McDonald, health officer.

Health officer, J. C. McDonald.

Clerk, J. N. Sliver.

Will have a pesthouse.

Cases of infectious diseases reported: Smallpox, 1; typhoid fever, 2; total number of infectious diseases, 3.

EDGERTON, WILLIAMS COUNTY.

Population, 1,200.

Person making report, Dr. C. Hathaway, health officer.

Health officer, Dr. C. Hathaway.

Clerk, Samuel Friger.

Have a Board of Health.

Cases of infectious diseases reported: Smallpox, 7; scarlet fever, 8; typhoid fever, 2; total number of infectious diseases, 18.

EDON, WILLIAMS COUNTY.

Population, 900.

Person making report, H. F. Alwood, health officer.

Health officer, H. F. Alwood.

Clerk, M. E. Townsend.

The sanitary condition of our village I consider is very good. We have no pesthouse.

Cases of infectious diseases reported: Scarlet fever, 4; typhoid fever, 1; measles, 15; total number of infectious diseases, 20.

ELMORE, OTTAWA COUNTY.

Population, 1,025.

Person making report, R. A. Willett, M. D., health officer.

Health officer, R. A. Willett, M. D.

This village as a rule comes as near being in a perfect sanitary condition as possible and the last year has been no exception, hence very little work has been necessary. We have no hospital or pesthouse to which smallpox patients may be removed. I have been appointed health officer in lieu of a Board of Health, and I believe that in villages this new method is superior to the old, as I have been a member of the local board several years and it was always difficult to get much work out of the members who have always served without compensation.

Cases of infectious diseases reported: Scarlet fever, 2; typhoid fever, 1; other infectious diseases, 3; total number of infectious diseases, 6.

ELMWOOD PLACE, HAMILTON COUNTY.

Population, 2,600.

Person making report, Dr. E. T. Busching, health officer.

Health officer, Dr. E. T. Busching.
Clerk, Dr. E. T. Busching.

No improvements in sanitary conditions over last year. No regulations enforced as regards milk supply as there have been no complaints thus far. Garbage and ashes collected as heretofore reported. We have had no difficulty in enforcing the new health code up to date. As we have no hospital or pesthouse for smallpox patients we quarantine in situ.

Cases of infectious diseases reported: Diphtheria, 1; scarlet fever, 2; total number of infectious diseases, 3.

ELYRIA, LORAIN COUNTY.

Population, 9,000.

Person making report, G. E. French, M. D., health officer.

Health officer, G. E. French, M. D.

Clerk, G. E. French.

Cases of infectious diseases reported: Smallpox, 4; diphtheria, 14; scarlet fever, 20; measles, 56; total number of infectious diseases, 92.

FAIRPORT HARBOR, LAKE COUNTY.

Population, 2,300.

Person making report, J. H. Werbeach, marshal.

Health officer, J. H. Werbeach.

Clerk, Harry Johnson.

We have no pesthouse.

Cases of infectious diseases reported: Smallpox, 1; diphtheria, 2; scarlet fever, 11; typhoid fever, 7; measles, 8; total number of infectious diseases, 30.

FARMERSVILLE, MONTGOMERY COUNTY.

Population, 530.

Person making report, A. W. Beall, health officer.

Health officer, A. W. Beall.

Our village is located upon very high ground. We have no standing water or ponds within two miles of us. The soil is a tough clay holding water almost like a cistern. Consequently nearly all privies are surface privies. Some of them, if not watched closely, get to be very filthy, and then when ordered cleaned sometimes cause a little friction. I think that the sanitary condition of our town is improving. Our town has been remarkably healthy. If you will notice by the census report we stand among the highest. We have one dairy in fairly good condition and the milk up to the standard. We have no pesthouse or hospital. I have had no especial difficulty in enforcing the new health code. We have a health officer in lieu of a health board. But at the request of the health officer the council appointed two of its members to assist the health officer in his decision in frictional cases.

Cases of infectious diseases reported, none.

FAYETTE, FULTON COUNTY.

Population, 1,000.

Person making report, Albert Ford, health officer.

Health officer, Albert Ford.

There is no hospital or pesthouse here for smallpox patients.

Cases of infectious diseases reported: Scarlet fever, 16; measles,

1; total number of infectious diseases, 17.

FELICITY, CLERMONT COUNTY.

Population, 700.

Person making report, M. H. Tucker, health officer.

Health officer, M. H. Tucker.

Cases of infectious diseases reported: Smallpox, 4; total number of infectious diseases, 4.

FINDLAY, HANCOCK COUNTY.

Population estimated, 20,000.

Person making report, Amos Beardsley, health officer.

Health officer, Amos Beardsley.

Clerk, C. W. Benedict.

The provisions of the new code have been taken up and executed without any friction or inconvenience. During the year six lateral sanitary sewers have been laid. A new garbage ordinance has been passed by the council upon recommendation of the board of health, and the same will be put in operation in March, 1904, by the provisions of the act. A substantial building, suitably located and admirably adapted for the requirements of a pesthouse has been purchased and is now occupied by smallpox patients. We would suggest that a law be passed whereby members of local boards shall receive the same compensation for their services as councilmen do, since we fail to see why one set of officials should receive a compensation for their services while another class performs duties as arduous and exacting gratis.

Cases of infectious diseases reported: Smallpox, 82; diphtheria, 2; scarlet fever, 20; typhoid fever, 22; whooping cough, 1; measles, 145; other infectious diseases, 44; total number of infectious diseases, 316.

FLETCHER, MIAMI COUNTY.

Population, 400.

Person making report, J. B. Barker, health officer.

Health officer, J. B. Barker.

Clerk, W. C. McAheny.

The village is in a good sanitary condition. Streets, alleyways, etc., are well kept. We have more than one mile of cement sidewalks, good gutters and drainage. Contagious diseases are promptly cared for. All available means are used to prevent the spread of infectious and contagious diseases.

Cases of infectious diseases reported: Typhoid fever, 2; mumps, 9; total number of infectious diseases, 11.

FOREST, HARDIN COUNTY.

Population, 1,200.

Person making report, Dr. W. T. Gemmill, clerk.

Health officer, John Handchy.

Clerk, Dr. W. T. Gemmill.

Cases of infectious diseases reported: Scarlet fever, 1; whooping cough, epidemic; chicken pox, epidemic.

FORT RECOVERY, MERCER COUNTY.

Population about 1,100.

Person making report, W. R. Taylor, health officer.

Health officer, W. R. Taylor.

Clerk, Thos. Durbin.

Cases of infectious diseases reported: Typhoid fever, 2; whooping cough not reported; total number of infectious diseases, 2.

FORT JENNINGS, PUTNAM COUNTY.

Population, 322.

Person making report, Jos. E. Stephan, M. D., health officer.

Health officer, Jos. E. Stephan, M. D.

Clerk, Fred Heising.

Cases of infectious diseases reported: Smallpox, 2; scarlet fever, 2; measles, were a number of cases but none reported; total number of infectious diseases, 4.

FOSTORIA, SENECA COUNTY.

Population, 8,500.

Person making report, W. N. Caldwell, health officer.

Health officer, W. N. Caldwell.

Clerk, R. B. Campbell.

There have been no improvements made in sanitary condition of our city. We consider it in very good sanitary condition. Have been no new regulations in regard to milk supply. Garbage is collected by city team daily. Have no difficulty concerning new code. Have neither hospital nor pest-house in which we can place smallpox patients.

Cases of infectious diseases reported: Smallpox, 2; diphtheria, 2; scarlet fever, 7; typhoid fever, 10; measles, 4; total number of infectious diseases, 25.

FRANKFORT, ROSS COUNTY.

Population, 900.

Person making report, Dr. L. N. Matteson, health officer.

Health officer, Dr. L. N. Matteson.

No improvements as to drainage or sewers more than to keep ditches open for as good surface drainage as possible. Have no one to take away garbage only as they do so themselves or forced to by health officer

Cases of infectious diseases reported: Smallpox, 1; membranous croup, 4; total number of infectious diseases, 5.

FRANKLIN, WARREN COUNTY.

Population, 3,000.

Person making report, D. A. Williams, health officer.

Health officer, D. A. Williams.

Clerk, S. S. Tibbals.

Cases of infectious diseases reported: Scarlet fever, 12; total number of infectious diseases, 12.

We do not require report of anything outside of smallpox, scarlet fever and diphtheria.

FREDERICKTOWN, KNOX COUNTY.

Population, 1,000.

Person making report, Ernest V. Ackerman, M. D., clerk of board.

Health officer, Thos. Burke.

Clerk, Ernest V. Ackerman, M. D.

No improvements in sanitary condition. No new regulations regarding milk supply, collection of garbage, etc. No difficulties in enforcing new health code. No hospital for smallpox.

Cases of infectious diseases reported: Scarlet fever, 2; total number of infectious diseases, 2.

FREEPORT, HARRISON COUNTY.

Population, 800.

Person making report, W. H. Lewis, health officer.

Health officer, W. H. Lewis.

I find that the present system of health officer is far better and easier controlled than old board of health.

Cases of infectious diseases reported: Pneumonia, 2; diphtheria, 7; whooping cough, 50; measles, 2; total number of infectious diseases, 61.

FREMONT, SANDUSKY COUNTY.

Population, 8,500.

Person making report, O. C. Vermilya, health officer.

Health officer, O. C. Vermilya, M. D.
Clerk, Adam Keller.

We have had but few cases of contagious diseases during the year and our most important work has been along the line of improving the sanitary condition of the city and an abandonment of the short sighted policy that looks only to an improvement of our present condition. We have found that for years our sewerage system has been constructed on too small a scale and of too small caliber. It is now plain to those who have considered the subject that it would have been much cheaper in the end and more satisfactory to have planned for the wants and needs of a growing city and the better sanitary demands of a progressive people. This policy we have repeatedly urged in connection with better drainage of several streets. Our board, in cooperation with others, has induced the council to remove the dirt from paved streets at least once a week and where citizens do not assist in the work by scraping the dirt into heaps for the city shovelers, the city charges this cost to the abutting property. Our school buildings, meat markets, slaughterhouses, ice supply and dairies have been kept under supervision and any violation of the code promptly corrected. The sanitary condition of our largest central school building has been an object of criticism for some time and last summer the ladies federation took up the subject as recommended by the board of health and succeeded in arousing enough public sentiment to enable the board of education to install a complete new system of mechanical heating and ventilation and also to equip the building with modern fire-escapes. To modify certain nuisances from gas and gaoline engines, our board passed a resolution that all such

engines should use an efficient muffler and conduct the burned gases to an altitude of twenty-five feet. We have no pesthouse and have succeeded admirably in handling our cases of smallpox by enforcing a vigorous quarantine over the residence of the patient and all persons exposed to the disease. Our board has for years furnished antitoxine to indigent diphtheria patients and successfully urged its use by physicians. In this connection it is gratifying to note that during these years our mortality from diphtheria and membranous croup has been almost nil.

Cases of infectious diseases reported: Smallpox, 1; scarlet fever, 7; typhoid fever, 13; whooping cough, 35; measles, 21; total number of infectious diseases, 77.

GAHANNA, FRANKLIN COUNTY.

Population, 400.

Person making report, D. L. Stygler, mayor and health officer.

Health officer, D. L. Stygler.

Cases of infectious diseases reported: Scarlet fever, 6; measles, 20; total number of infectious diseases, 26.

GALION, CRAWFORD COUNTY.

Person making report, H. H. Hartmann, health officer.

Health officer, H. H. Hartmann, M. D.

The board has adopted new rules and regulations. All meat and milk dealers are required to have certificates of inspections. Milk dealers must use coupon tickets. We have no hospital or pesthouse for smallpox patients.

Cases of infectious diseases reported: Smallpox, 8; diphtheria, 2; scarlet fever, 9; typhoid fever, 20; whooping cough, 2; measles, 150; total number of infectious diseases, 191.

GAMBIER, KNOX COUNTY.

Population, 600.

Person making report, A. D. Welker, health officer.

Health officer, A. D. Welker.

Clerk, Andrew Bickel.

Cases of infectious diseases reported: Scarlet fever, 21; measles, 4; total number of infectious diseases, 25.

GENEVA, ASHTABULA COUNTY.

Population, 2,350.

Person making report, F. C. Smith, M. D., health officer.

Health officer, F. C. Smith, M. D.

Clerk, W. K. Gault.

We have had no difficulty in enforcing the code. We have no hospital or other place to put smallpox patients. Sanitary condition of town very good at present. A system of sewerage was commenced during the year 1903 but not completed. The board of health would like some law or laws made to regulate barber shops, as we have had a good deal of trouble from barber's itch during the past few months. Meetings held, 17, total expenses of the board, \$269.08. Births, 31; deaths, 36; nuisances abated, 40.

Cases of infectious diseases reported: Diphtheria, 1; scarlet fever, 3; typhoid fever, 5; measles, 5; total number of infectious diseases, 14.

GERMANTOWN, MONTGOMERY COUNTY.

Population, 2,000.

Person making report, William Schaeffer, health officer.

Health officer, William Schaeffer.

Clerk, J. S. Robertson, M. D.

The sanitary condition of our village is about the same as at the last report.

Cleanliness is our motto, and streets and alleys must be cleared of all garbage, etc., which is removed to a proper dumping place, outside the village limits. The regulations regarding the supply of milk are cleanliness of dairies and the health of dairy cows, is looked after. The new code of health is all right and we had no trouble in enforcing it. We have no hospital or pesthouse to which small-pox patients may be removed.

Cases of infectious diseases reported: Smallpox, 1; scarlet fever, 3; typhoid fever, 1; whooping cough, 2; measles, 3; total number of infectious diseases, 10.

GIBSONBURG, SANDUSKY COUNTY.

Population, 1,791.

Person making report, W. O. Dipman, health officers.

Health officer, W. O. Dipman.

Clerk, A. C. Forsyth.

Cases of infectious diseases reported: Smallpox, 1; typhoid fever, 8; total number of infectious diseases 9.

GIRARD, TRUMBULL COUNTY.

Person making report, Fred C. Hunt, M. D., health officer.

Health officer, Fred C. Hunt, M. D.

Clerk, E. Davis.

We have no pesthouse.

Cases of infectious diseases reported: Smallpox, 2; diphtheria, 7; membranous croup, 11; scarlet fever, 2; typhoid fever, 11; whooping cough, 4; other infectious diseases, 1; total number of infectious diseases, 33.

GLENDALE, HAMILTON COUNTY.

Population, 1,485.

Person making report, Clifford Allen, health officer.

Health officer, Clifford Allen.

Sanitary conditions are good. Have no milk or garbage regulations. Have no hospital. All regulations are enforced. New plan works satisfactorily.

Cases of infectious diseases reported: Diphtheria, 4; scarlet fever, 12; total number of infectious diseases, 16.

GLENMONT, HOLMES COUNTY.

Population, 200.

Person making report, Geo. L. Robinson, mayor.

Clerk, W. F. Mitchart.

Cases of infectious diseases reported: Smallpox, 9; scarlet fever, 3; whooping cough, 25; measles, 35; total number of infectious diseases, 72.

GLENVILLE, CUYAHOGA COUNTY.

Population, 7,000.

Person making report, B. F. Carpenter, health officer.

Health officer, B. F. Carpenter.

Clerk, M. W. Wiles.

Cases of infectious diseases reported: Diphtheria, 4; scarlet fever, 17; measles, 5; total number of infectious diseases, 26.

GRAFTON, LORAIN COUNTY.

Population, 1,400.

Person making report, Asa Linderman, health officer.

Health officer, Asa Linderman.

Clerk, J. R. Knight.

Cases of infectious diseases reported: Diphtheria, 3; membranous croup, 2; scarlet fever, 12; typhoid

fever, 3; whooping cough, 8; measles, 125; total number of infectious diseases, 153.

GRAND RAPIDS, WOOD COUNTY.

Population, 560.

Person making report, Jas. H. Williams, health officer.

Health officer, Jas. H. Williams.

The sanitary condition of the village has been greatly improved by the repair of the "Gilead side cut" a portion of the Miami and Erie canal bounding the village on the north, which had been virtually abandoned for several years past. The legislation at the last regular session (1901) made an appropriation of \$1,000.00 for the purpose, and the state board of public works made the improvement this fall. The only milk sold is by neighboring farmers, and the supply is known to conform to the dairy and food laws. While the collection of garbage and disposition thereof is an improvement on former years, there is still much to be desired in that particular. I have encountered no serious difficulty in enforcing the new code, but have been hampered to some extent on account of lack of funds. We have neither pesthouse nor hospital for smallpox patients. I am health officer, acting in lieu of board, and so far as I am advised, the new plan is deemed more satisfactory than the old. It is considered that more prompt attention can be had in answer to complaints, and unsanitary conditions remedied much more quickly than by the circumlocution of a board. I am of the opinion that our present sanitary condition is fairly good.

GREEN CAMP, MARION COUNTY.

Population, 400.

Person making report, G. W. Collins.

We have no pesthouse. The health of the village is good. There have been no improvements.

GREENFIELD, HIGHLAND
COUNTY.

Population, 4,000.

Person making report, C. S. Clouser, health officer.

Health officer, C. S. Clouser.

I was appointed in lieu of board of health, and from what little experience I have had think it a better plan as it places the responsibility wholly on the health officer. As far as improvement in sanitary conditions I can say there has not been much done in the last year. The only trouble I have, is in having the doctors reporting cases. Some are prompt in reporting while some will not report until neighbors and friends have been exposed, and sometimes not until the patient has died, and we are called to lay them out for burial. We have no pesthouse or hospital and depend wholly on quarantining residences. I give special attention to disinfection of houses, bedding, clothing, or anything that has been exposed. I found that the largest per cent. of deaths from diphtheria was where children were neglected and did not receive the proper medical attention soon enough. But when they saw that about 50 per cent. of the cases were fatal, they began to be more careful and we were able to stop it. I think the circulars I received from you did much good.

Cases of infectious diseases reported: Diphtheria, 8; membranous croup, 1; typhoid fever, 1; whooping cough, 1; total number of infectious diseases, 11.

GROVE CITY, FRANKLIN
COUNTY.

Population, 800.

Person making report, M. L. Harsh, health officer.

Health officer, M. L. Harsh.

Clerk, Dr. Frank Wright.

Cases of infectious diseases reported: Measles, 3; total number of infectious diseases, 3.

GROVEPORT, FRANKLIN COUNTY.

Population, 600.

Person making report, C. R. Clement, health officer.

Health officer, C. R. Clement.

Cases of infectious diseases reported: Typhoid fever, 1; whooping cough, 11; other infectious diseases, 7; total number of infectious diseases, 19.

HAMDEN, VINTON COUNTY.

Population, 1,000.

Person making report, E. S. Ray, M. D., secretary of board.

Health officer, Geo. Wilbur.

Clerk, E. S. Ray, M. D.

Cases of infectious diseases reported: Diphtheria, 1; scarlet fever, 1; typhoid fever, 8; measles (not all cases reported to board), 8; total number of infectious diseases, 10.

HAMILTON, BUTLER COUNTY.

Population, 30,000.

Person making report, Mark Millikin, health officer.

Health officer, Mark Millikin, M. D. Clerk, Ben Mick.

No new developments have been made as to additions to the sanitary equipment. The Emergency hospital was improved last September by the addition of water from the city, and a strong, high wire fence about the grounds. It was also varnished and whitewashed on the interior. This is

our pesthouse. Council has been asked to provide dump grounds for night soil. The board of health has employed a veterinarian to inspect all cattle from which milk is sold in the city.

Cases of infectious diseases reported: Smallpox, 56; diphtheria, 45; membranous croup, 1; scarlet fever, 45; typhoid fever (not accurate), 20; whooping cough (not accurate), 0; measles (not accurate), 3; other infectious diseases, 5; total number of infectious diseases, 175.

HAMLER, HENRY COUNTY.

Population about 700.

Person making report, Wm. Barhite, Sr., health officer.

Health officer, Wm. Barhite, Sr.

Clerk, W. R. Stateler, M. D.

We have no hospital or pesthouse. New plan is satisfactory as far as we have endeavored to enforce it.

Cases of infectious diseases reported: Scarlet fever, 2; whooping cough, 10; measles, 12; other infectious diseases, 15; total number of infectious diseases, 39.

HANGING ROCK, LAWRENCE COUNTY.

Population, 600.

Person making report, Joseph Kinkaid, health officer.

Health officer, Joseph Kinkaid.

Clerk, Henry Muntel.

No improvements in sanitary condition this year. Our village is a country village and no milk dairies here. We have no hospital or pesthouse for smallpox. We guard them wherever they take it. We have had no trouble in enforcing the new code so far.

Cases of infectious diseases reported: Smallpox, 38; typhoid fever,

11; measles, 3; total number of infectious diseases, 52.

HANOVER, COLUMBIANA COUNTY.

Population, 400.

Person making report, H. C. Dutton, health officer.

Health officer, H. C. Dutton.

Clerk, L. F. Ling.

Cases of infectious diseases reported: Typhoid fever, 1; total number of infectious diseases, 1.

HARRISON, HAMILTON COUNTY.

Population, 1,756.

Person making report, C. D. Bevis, secretary.

Health officer, Abe Loos.

Clerk, C. D. Bevis.

Health of corporation inhabitants has been good. All in good running order, no complaints.

Cases of infectious diseases reported: None.

HARRISBURG, FRANKLIN COUNTY.

Population about 300.

Person making report, Fred Bartsch, health officer.

Health officer, Fred Bartsch.

I have a great deal of trouble with our physicians to get their certificate and get them to report cases. We have no hospital. I believe the state board of health should notify all physicians and insist on them doing their duty in regard to reporting all cases.

Cases of infectious diseases reported: None.

HARROD, ALLEN COUNTY.

Population, 450.

Person making report, John Blair, Sr., health officer.

Health officer, John Blair, Sr.

Clerk, L. T. Hull.

Cases of infectious diseases reported: Typhoid fever, 1; total number of infectious diseases, 1.

HARTWELL, HAMILTON COUNTY.

Population, 2,000.

Person making report, O. W. Butler, M. D., health officer.

Health officer, O. W. Butler, M. D.

There have been no important features in the work of the board during the past year, other than the abolishing of the board in office on the first of May, and the assumption of its duties by the board of council. There has been no change in the sanitary conditions of the village, and no new regulations enforced in regard to milk supply or collection of garbage. We have had no difficulty in enforcing any of the regulations of the code. We have no hospital or pesthouse, but have been sending smallpox patients to the Cincinnati branch hospital. We have had but little work out of the ordinary routine during the past year, but the new plan has, I think, been satisfactory.

Cases of infectious diseases reported: Smallpox, 2; typhoid fever, 5; whooping cough (a number of cases during the summer, but not reported); measles, 1; total number of infectious diseases reported, 8.

HASKINS, WOOD COUNTY.

Population, 400.

Person making report, H. J. Johnston, M. D., health officer.

Health officer, H. J. Johnston, M. D.

Clerk, Chas. S. Woodford.

Cases of infectious diseases reported: Diphtheria, 1; whooping cough, 3; total number of infectious diseases, 4.

HIGGINSPOORT, BROWN COUNTY.

Population, 600.

Person making report, F. M. Cahill, board of health.

Health officer, F. M. Cahill.

The sanitary condition of this village is good. The new plan has been very satisfactory here. We have no pesthouse and no hospital. We have not had any contagious diseases here this year.

HILLSBORO, HIGHLAND COUNTY.

Population, 4,553.

Person making report, J. D. McBride, M. D., health officer.

Health officer, J. D. McBride, M. D.

Clerk, Chas. McConnaughey.

No improvements in the sanitary condition of the village in past year. No new regulations in regard to the milk supply and collection of garbage. No trouble in enforcing the new health code. Have no hospital or pesthouse.

Cases of infectious diseases reported: Scarlet fever, 122; total number of infectious diseases, 122.

HIRAM, PORTAGE COUNTY.

Person making report, Edwin L. Hall, clerk of village.

Health officer, F. H. Hurd, M. D.

Clerk, Edwin L. Hall.

Cases of infectious diseases reported: Smallpox, 6; typhoid fever, 3; measles, 12; total number of infectious diseases, 21.

HOLLANSBURG, DARKE COUNTY.

Population, 400.

Person making report, A. W. Meek, health officer.

Health officer, A. W. Meek.

Clerk, C. C. Davis.

Cases of infectious diseases reported: Scarlet fever, 1; typhoid fever, 2; total number of infectious diseases, 3.

HOLMESVILLE, HOLMES COUNTY.

Population, 304.

Person making report, L. F. Miller, clerk board of health.

Clerk, L. F. Miller.

Cases of infectious diseases reported: Scarlet fever, 1; typhoid fever, 1; total number of infectious diseases, 2.

HUBBARD, TRUMBULL COUNTY.

Population, 1,200.

Person making report, W. S. Bond, M. D., health officer.

Health officer, W. S. Bond, M. D.

Cases of infectious diseases reported: Smallpox, 1; scarlet fever, 1; total number of infectious diseases, 2.

HUDSON, SUMMIT COUNTY.

Population, 1,000.

Person making report, H. C. Coolman, health officer.

Health officer, H. C. Coolman.

Clerk, H. C. Coolman.

The new health code has been enforced with little or no trouble. As regards garbage, etc., a suitable dumping ground was purchased by the village last spring and all garbage collected at stated intervals and deposited thereon. New sewers have been added to the old system. Have no pesthouse for smallpox, but ground

has been purchased and will build in near future.

Cases of infectious diseases reported: Diphtheria, 3; membranous croup, 1; typhoid fever, 3; whooping cough, 21; total number of infectious diseases, 28.

HUNTSVILLE, LOGAN COUNTY.

Population, 400.

Person making report, G. W. Jones, M. D., health officer.

Health officer, G. W. Jones, M. D.

The sanitary conditions are number one. All quarantine laws strictly enforced where needed. The new plan has been very satisfactory.

Cases of infectious diseases reported: None.

HURON, ERIE COUNTY.

Population, 2,000.

Person making report, S. N. Lennon, health officer.

Health officer, S. N. Lennon.

Clerk, G. B. Morse.

Cases of infectious diseases reported: Diphtheria, 1; typhoid fever, 18; whooping cough, 2; measles, 3; other infectious diseases, 4; total number of infectious diseases, 29.

IRONTON, LAWRENCE COUNTY.

Population, 11,868.

Person making report, J. W. Lowry, health officer.

Health officer, J. W. Lowry, M. D.

Clerk, T. J. Hayes.

Cases of infectious diseases reported: Smallpox, 340; diphtheria, 4; membranous croup, 3; total number of infectious diseases, 347.

JACKSON, JACKSON COUNTY.

Person making report, G. W. Finney, clerk.

Health officer, W. H. Brunton.

Clerk, G. W. Finney.

Cases of infectious diseases reported: Smallpox, 28; membranous croup, 1; scarlet fever, 28; total number of infectious diseases, 57.

JACKSON CENTER, SHELBY COUNTY.

Population, 800.

Person making report, A. V. Derr, health officer.

Health officer, A. V. Derr.

There are none of the doctors here who report to me the births and deaths and of course I cannot report them. The doctors here are a little careless in reporting to me and I think it would be a good idea if you would write them and notify them of their duty. And when a doctor is called in to see a case and he can not make up his mind the first couple of visits what the case will develop into he ought to direct the people to let no outsiders in and to notify the head of the family for none of them to come in contact with other people, any more than is necessary until they can fully make up their mind as to the nature of the disease. In lots of cases they let outsiders in and out till I quarantine the house.

Cases of infectious diseases reported: Scarlet fever, 5; total number of infectious diseases, 5.

Cases of infectious diseases reported: Smallpox, 1; diphtheria, 1; total number of infectious diseases, 2.

JEFFERSONVILLE, FAYETTE COUNTY.

Population, 800.

Person making report, N. C. Wilcox, health officer.

Health officer, N. C. Wilcox.

Cases of infectious diseases reported: Smallpox, 4; scarlet fever, 2; whooping cough, 2; total number of infectious diseases, 8.

JENERA, HANCOCK COUNTY.

Population, 256.

Person making report, Charles H. Heldman, health officer.

Health officer, Charles H. Heldman.
Clerk, George Gossman.

There have been no improvements to better the sanitary condition of our village. Our milk supply is in good condition. The garbage is well collected and hauled outside the corporation and buried. We have no hospital or pesthouse to which smallpox patients may be removed. We make a general cleanup every spring in our little village.

Cases of infectious diseases reported: Diphtheria, 2; total number of infectious diseases, 2.

JUNCTION CITY, PERRY COUNTY.

Population, 450.

Person making report, Dr. P. A. Gordon, health officer.

Health officer, Dr. P. A. Gordon.

Clerk, Jasper Klingler.

Have made no improvements for the reason that our sanitary conditions are good and the work done by the

JAMESTOWN, GREENE COUNTY.

Population, 1,205.

Person making report, W. F. McMillen, health officer.

Health officer, W. F. McMillen.

Clerk, C. A. Davis.

board and health office has been very effective. We had one case of smallpox. Fortunately we learned of the exposure of the victim in good time. Effective quarantine and universal vaccination did the rest.

Cases of infectious diseases reported: Smallpox, 1; typhoid fever, 4; total number of infectious diseases, 5.

KALIDA, PUTNAM COUNTY.

Population, 622.

Person making report, W. W. Dunavin, health officer.

Health officer, W. W. Dunavin.

No improvements have been made.

We have no hospital or pesthouse.

Think the plan of appointing health officer in lieu of a board of health has been very satisfactory here.

I have had only one case of contagious disease, (scarlet fever) which was quarantined and the spread of the disease was prevented.

Cases of infectious diseases reported: Scarlet fever, 1; typhoid fever, 3; measles, epidemic, cannot enumerate; total number of infectious diseases, 4.

KENT, PORTAGE COUNTY.

Population, 4,500.

Person making report, Mr. B. C. Newberry, health officer.

Health officer, B. C. Newberry.

Clerk, Dr. W. W. Reed.

Cases of infectious diseases reported: Smallpox, 5; diphtheria, 3; scarlet fever, 2; whooping cough, 1; measles, 5; total number of infectious diseases, 16.

KENTON, HARDIN COUNTY.

Population, 6,852.

Person making report, J. W. Hammond, chief of police.

Health officer, J. W. Hammond.

Clerk, Dr. Protzman.

Cases of infectious diseases reported: Smallpox, 7; diphtheria, 2; scarlet fever, 5; total number of infectious diseases, 14.

KILLBUCK, HOLMES COUNTY.

Population, 400.

Person making report, Dr. Emil J. Heinig, health officer.

Health officer, Emil J. Heinig, M. D. Clerk, B. A. McDowel.

We have no pesthouse or any other arrangements to take care of smallpox cases.

There were about half a dozen cases of scarlet fever and several of measles but the doctors never reported any of them.

KIRBY, WYANDOT COUNTY.

Person making report, Dr. E. E. Burns, health officer.

Health officer, Dr. E. E. Burns.

Cases of infectious diseases reported: Diphtheria, 5; typhoid fever, 2; whooping cough, 18; measles, 9; total number of infectious diseases, 34.

KOSSUTH, AUGLAIZE COUNTY.

Population, 150.

Person making report, J. L. Springer, mayor.

A reasonable amount of care has been given to garbage and so on.

No difficulties in enforcing the health code.

No hospital.

No report of infectious diseases.

LAKEWOOD, CUYAHOGA COUNTY.

Population, 5,000.

Person making report, A. E. McClure, M. D., health officer.

Health officer, A. E. McClure, M. D.
Clerk, Henry Seusel.

Have a health board of five members who were named by the mayor and confirmed by the village council. The health board appointed a health officer. Since the new board has been in office we have established a system of collecting garbage. Two collections being made each week which we find very necessary and satisfactory to the people. We have no pest-house nor detention hospital. We have had no trouble in enforcing new code and the residents seem to be generally satisfied with it. We also have arrangements made whereby we can collect milk when necessary and have the same tested thoroughly. Our board meets twice each month and all the members so far have taken a great deal of interest in the work. We have always had a quorum to do business with at each meeting. We have also a plumbing inspector and sanitary officer, both being accountable to the board of health. We have had some trouble in getting reports from physicians and undertakers but there has been considerable improvement of late in this respect.

Cases of infectious diseases reported: Diphtheria, 5; membranous croup, 2; scarlet fever, 10; typhoid fever, 8; whooping cough, 4; measles, 18; other infectious diseases, 2; total number of infectious diseases, 49.

LANCASTER, FAIRFIELD COUNTY.

Population, 12,000.

Person making report, G. W. O'Grady, M. D., health officer.

Health officer, G. W. O'Grady, M. D.
Clerk, Geo. Cunningham.

The city of Lancaster, a city of about 12,000 population has a very poor system of sewerage, but in the past year it has been slightly im-

proved. The water supply is very good and free from pollution, but very hard and containing considerable iron. This supply of water is a recent improvement. There are not any regulations in regard to the milk supply or collection of garbage, but a regular system of collection of garbage should be established. There is a great deal of trouble with the new code, i. e. much misunderstanding concerning the funds of the board of health and provisions made for obtaining same. There have been new rules and regulations passed by the board which are an improvement over the former ones. There was room for improvement in the health department of this city, but now under the new rules conditions have changed. All the cases of typhoid fever, whooping cough, measles and mumps were not reported.

Cases of infectious diseases reported: Smallpox, 1; diphtheria, 2; scarlet fever, 14; typhoid fever, 87; whooping cough, 27; measles, 150; other infectious diseases, 150; total number of infectious diseases, 431.

LARUE, MARION COUNTY.

Population, 1,300.

Person making report, Geo. W. Long, health officer.

Health officer, Geo. W. Long.
Clerk, R. B. Bell.

Cases of infectious diseases reported: Smallpox, 5; total number of infectious diseases, 5.

LAURA, MIAMI COUNTY.

Population, 450.

Person making report, Dr. S. P. Neff, health officer.

Health officer, Dr. S. P. Neff.
Clerk, Arthur Hess.

We have no hospital or pesthouse to which smallpox patients may be removed.

Our board has not enforced any new regulations as regards the milk supply, the collection of garbage, etc.

There have not been any improvements made in the sanitary condition of our village, although the sanitary condition is good.

The most important feature of the work of the board during the year was to look after sanitary conditions, abatement of nuisances and the prevention of contagious diseases which has been very well looked after.

The streets and alleys are in fair condition. Night soil, garbage, etc., is looked after by the householders.

There have been no prosecutions during the year.

Smallpox and whooping cough and one case of diphtheria are all the contagious diseases reported.

Quarantine was strictly enforced, all the pupils were compelled to present a certificate of successful vaccination.

The board of health meets as a rule once a month and has maintained an organization for the last four years.

Our council paid a sanitary policeman during our smallpox epidemic.

Council refuses to pay for vaccination among the poor.

Our school is a sub-district of the township school district and the township school board stood in harmony with the village board of health in enforcing the vaccination of school children without any provision as to who was to pay for vaccination of the poor, so that bill is refused by both parties and is left unpaid.

Cases of infectious diseases reported: Smallpox, 11; diphtheria, 1; typhoid fever, 3; whooping cough, 58; total number of infectious diseases, 73.

LEBANON, WARREN COUNTY.

Population, 2,800.

Person making report, Frank Ludlow, clerk of health board.

Health officer, G. M. Curry, M. D.
Clerk, F. Ludlow.

Streets, yards, etc., are looked after by the health officer and policeman, and are kept in good condition. Garbage is removed by wagons and carts outside of the corporation. Night soil is removed in closed wagons or barrels in the summer time at night and in winter generally at night, and buried outside the city limits.

All contagions are properly reported and a record made of them. The superintendent of schools requires vaccination. There is no record made of these vaccinations.

The board has only held four meetings during the year. There have been several forced cleaning of vaults when property owners failed to do so, but no prosecutions.

The general sanitary condition of the little city is very good, none better in the state, and the citizens almost as a unit assist the health officer in every way, with very few exceptions.

Cases of infectious diseases reported: Diphtheria, 2; typhoid fever, 2; total number of infectious diseases, 4.

LEESBURG, HIGHLAND COUNTY.

Population, estimated, 1,200.

Person making report, H. A. Beeson, health officer.

Health officer, H. A. Beeson, M. D.

No changes have been made in sanitary matters or conditions. No difficulty in any way resulting from enforcing law.

Cases of infectious diseases reported: Whooping cough, 6; total number of infectious diseases, 6.

LEETONIA, COLUMBIANA COUNTY.

Population, 3,000.

Person making report, S. R. McCready, M. D., health officer.

Health officer, S. R. McCready.

Clerk, T. S. Arnold.

Cases of infectious diseases reported: Smallpox, 1; membranous croup, 1; typhoid fever, 3; whooping cough, 33; other infectious diseases, 8; total number of infectious diseases, 46.

LEIPSIC, PUTNAM COUNTY.

Population, 1,785.

Person making report, J. C. McClung, health officer.

Health officer, J. C. McClung.

Clerk, H. G. Moenter.

No improvements have been made in sanitary conditions. Effort has been made to remove all unsanitary conditions brought to the attention of the health officer, and his efforts have generally been successful. The board of health held one meeting January 23d, and one meeting June 12th, 1903. Where there is so little sickness and few fatalities, people are more indifferent to sanitary conditions and sanitary measures are more difficult of enforcement.

Cases of infectious diseases reported: None.

LEWISBURG, PREBLE COUNTY.

Population, 600.

Person making report, A. N. Cox, clerk.

Health officer, A. N. Cox.

Clerk, A. N. Cox.

We have no pesthouse.

Cases of infectious diseases reported: Diphtheria, 1; typhoid fever, 1; total number of infectious diseases, 2.

LEXINGTON, RICHLAND COUNTY.

Population, 550.

Person making report, J. P. Stober, health officer.

Health officer, J. P. Stober, M. D.

I think a health officer in lieu of a board is all right, yet it throws quite a responsibility on the health officer.

We have a very healthy village, well drained, good water and have it thoroughly cleaned every spring.

Cases of infectious diseases reported: Typhoid fever, 1; measles, had epidemic, do not know number; total number of infectious diseases, 1.

LIMAVILLE, STARK COUNTY.

Population, 200.

Person making report, O. P. Sebrell, clerk.

Health officer, O. P. Sebrell.

Clerk, O. P. Sebrell.

Our improvements are rather slow, for we are improving as we can. The milk supply is very good. We have no milk peddlers. Garbage of the village is kept cleaned up. We have had no trouble in enforcing the law for every one seems to clean his rubbish up and keep things clean. We have no hospital or pesthouse.

Cases of infectious diseases reported: Typhoid fever, 2; measles, 1; total number of infectious diseases, 3.

LIMA, ALLEN COUNTY.

Population, 28,000.

Person making report, A. L. Jones, health officer.

Health officer, A. L. Jones, M. D.

Clerk, O. J. Rose.

We are heartily in favor of the new code. We are now working on milk question. We have no garbage collection or cremation. Also no pest house, but exert a rigid quarantine with guard and vaccination of persons exposed.

Cases of infectious diseases reported: Smallpox, 17; diphtheria, 32; membranous croup, 7; scarlet fever, 22; measles, 40; total number of infectious diseases, 118.

LISBON, COLUMBIANA COUNTY.

Person making report, David H. Eells, health officer.

Health officer, David H. Eells.

As our town is small, and health officer's salary is small, we have no office in which to do business. There has been no record kept of births and deaths, but our doctors are very prompt in reporting contagious diseases and we have had very good success in not having any deaths or even the second case of any of the three contagious diseases that we have had in our town in the last year.

Cases of infectious diseases reported: Smallpox, 1; diphtheria, 1; scarlet fever, 1; total number of infectious diseases, 3.

LITHOPOLIS, FAIRFIELD COUNTY.

Population, 400.

Person making report, F. M. Taes, health officer.

Health officer, F. M. Taes.

Cases of infectious diseases reported: Measles, 75; total number of infectious diseases, 75.

LOCKLAND, HAMILTON COUNTY.

Population, 2,700.

Person making report, Valentine Harting, health officer.

Health officer, Valentine Harting.

The sanitary condition of our village is better just now than it has been for a number of years. The streets and alleys, gutters, etc., are kept cleaner

owing to the closing down of the starch works. There are no new regulations as regards the milk supply. But our garbage is collected semi-weekly in a careful manner. No complaints in this line. Have only been working under the new health code about one month and have had no trouble whatever. We have no hospital or pesthouse where patients could be taken for treatment. I enforce a very strict quarantine. My experience as health officer in lieu of a board of health is but brief but as far as I have gone I think it is just the thing for all villages. They will get better results and quicker action if the officer understands his business and is not handicapped which is often the case where they have a board of health.

Cases of infectious diseases reported: Smallpox, 36; diphtheria, 3; scarlet fever, 9; typhoid fever, 2; chicken pox, 1; total number of infectious diseases, 51.

LODI, MEDINA COUNTY.

Population, 1,200.

Person making report, Henry Selders, health officer.

Health officer, Henry Selders.

My appointment commenced Dec. 4, 1903, so we have not had time to test the health officer in lieu of board of health. As regards milk, there has nothing been done. Garbage has been collected and taken outside of the corporation. We have no hospital or pesthouse.

Cases of infectious diseases reported: Diphtheria, 6; scarlet fever, 20; measles, 2; total number of infectious diseases, 28.

LONDON, MADISON COUNTY.

Population, 3,600.

Person making report, W. H. Christopher, health officer.

Health officer, W. H. Christopher.

I found things on accepting office last June in a chaotic condition. I am having council adopt and print State boards orders and regulations made a part of village ordinance. They were slow to move in the matter. I am also having printed on postal cards matter on fourth page of this sheet and same put in hands of physicians with instructions to sanitary officer to collect monthly. Our council is arranging to have village sewerred. We have already made some improvements along that line. I am urging council to employ or authorize the employment of garbage collector. No new regulations regarding milk supply. At last grand jury I secured the indictment of a meat dealer for selling diseased meats with every prospect of conviction. He is an old offender, but it is the first time he has been "landed." Have not encountered difficulties with new code. It is satisfactory to us. We have a pesthouse. The keeping of hogs in village during summer months is our great difficulty. We enforced law latter part of last summer and then the garbage question took its place.

Cases of infectious diseases reported: None.

LORAIN, LORAIN COUNTY.

Population, 24 900, estimated.

Person making report E. V. Hug, M. D., health officer.

Health officer, Edw. V. Hug, M. D.

Clerk, Florence Steinhoff.

The main features of our work during the year have been toward more efficient sanitary regulations. We have adopted an ordinance regulating the sale of milk and providing for its inspection. We have passed another ordinance regulating barbers. Many new sewers have contributed to improving our sanitary condition. We have as

yet no permanent pesthouse. We bought a site several years ago, but injunction proceedings were brought, and have not yet been definitely decided by the courts. By the report you will see that we have had but three cases of smallpox, two occurring in one family. In each case the disease was recognized in its incipency and energetic measures taken toward preventing its spread. One of the darkest features of our mortality report is the number of deaths due to typhoid fever, the number reaching thirteen out of a total of 166 cases reported. All the deaths occurred in the last half of the year after the change in the water supply was made. In 1902 we had four undisputed deaths from this disease and one or two which should be classed under pneumonia. We have had no difficulties under the new code. The expenses of our board have been less than usual, owing largely to the absence of epidemics.

Cases of infectious diseases reported: Smallpox, 3; diphtheria, 62; membranous croup, 2; scarlet fever, 11; typhoid fever, 166; whooping cough, 2; measles, 43; other infectious diseases, 10; total number of infectious diseases, 299.

LOUDONVILLE, ASHLAND COUNTY

Population, 1,800.

Person making report, M. R. Walter, clerk.

Health officer, Wm. Conrad.

Clerk, M. R. Walter.

Cases of infectious diseases reported: Diphtheria, 3; scarlet fever, 3; typhoid fever, 2; whooping cough, 45; measles, 35; total number of infectious diseases, 88.

LOUISVILLE, STARK COUNTY.

Population, 1,400.

Person making report, F. W. Shilling, health officer.

Health officer, F. W. Schilling.
Clerk, Lee Warstler.

Cases of infectious diseases reported: Smallpox, 8; whooping cough, 1; total number of infectious diseases, 9.

Cases of infectious diseases reported: Diphtheria, 1; typhoid fever, 3; total number of infectious diseases, 4.

LOVELAND, CLERMONT AND HAMILTON COUNTIES.

Population, 1,260.

Person making report F. H. Lever, health officer.

Health officer, F. H. Lever.

The new code has, from all appearances, been a success. No new regulation has required enforcement except that relating to weeds on vacant lots. We have required no pesthouses, etc., as the village has been exceptionally free from contagious or infectious diseases of all kinds. The death rate of less than one per cent., I consider extremely low. Copies of our new rules and regulations have been freely distributed throughout the village. Owing to the money in sanitary fund having been transferred, we have been unable to meet the garbage question. A large number of nuisances of a minor character have been disposed of without difficulty. The rule requiring physicians to report all births and deaths has not been very well observed by some of the physicians; but has been due to neglect more than anything else.

Cases of infectious diseases reported: Diphtheria, 1; typhoid fever, 3; measles, 2; total number of infectious diseases, 6.

LOWELL, WASHINGTON COUNTY.

Population, 500.

Person making report, Jonas Mason, clerk.

Health officer, A. J. Thompson.
Clerk, J. D. Mason.

LOWELLVILLE, MAHONING COUNTY.

Population, 1,137.

Person making report, J. H. McWilliams, health officer.

Health officer, J. H. McWilliams.
Clerk, J. Cunningham.

No regulation as regards milk. Have good garbage dump which costs \$18.00 a year rent, outside village.

Cases of infectious diseases reported: None.

LOWER SALEM, WASHINGTON COUNTY.

Population, 250.

Person making report, Jos. P. Harts horn, health officer.

Health officer, Jos. P. Hartshorn.

There has not been any improvement made in the sanitary condition of the village. There are no regulations in regard to milk and garbage. I have had no trouble with the new code.

Cases of infectious diseases reported: None.

LYNCHBURG, HIGHLAND COUNTY.

Population, 950.

Person making report, Martin V. Nolder, health officer.

Health officer, Martin V. Nolder.
Clerk, W. A. Saylor.

I have eleven deaths and one still-birth to report for the last year.

The health of the town is very good at this time. I cannot make a good report for our board of health for they will not attend the meetings of the board; there are two members of the board who attend, but the others do

not. The most important improvement is in disinfecting the school building and churches and keeping the town cleaned of garbage. In regard to the milk supply there has been no regulation about the milk. The garbage is put in barrels and hauled out of the corporation. We have had some trouble to get the creamery board to keep the stench down. The waste from the creamery runs in an open drain for about three hundred feet and it causes a bad stench in hot weather. We have no hospital or pesthouse. I cannot say about other towns where there is just a health officer but can say, if I had the chance to work under the State Board it would be better, for where there are only two members of the board who meet, it don't give the health officer any chance to do his duty.

Cases of infectious diseases reported: None.

McARTHUR, VINTON COUNTY.

Population, 900.

Person making report, Geo. Partlow, health officer.

Health officer, Geo. Partlow.

Cases of infectious diseases reported: Scarlet fever, 23; total number of infectious diseases, 23.

McCONNELLSVILLE, MORGAN COUNTY.

Population, 2,000.

Person making report, Wm. Dille, health officer.

Health officer, Wm. Dille.

Clerk, M. E. Danford.

Cases of infectious diseases reported: Membranous croup, 1; typhoid fever, 1; measles, 2; other infectious diseases, 2; total number of infectious diseases, 6.

MACKSBURG, WASHINGTON COUNTY.

Population, 700.

Person making report, J. B. DeLong, health officer.

Health officer, J. B. DeLong.

Clerk, Walter Fischer.

The new code we have not done much with, but what we have done is all right. If this report is not right please inform me where it is wrong, and I will try and do better next time. The town is in good shape now.

Cases of infectious diseases reported: Diphtheria, 3; total number of infectious diseases, 3.

MADISON, LAKE COUNTY.

Population, 900.

Person making report, J. V. Winans, health officer.

Health officer, J. V. Winans.

Clerk, Walter Scott.

Cases of infectious diseases reported: Diphtheria, 4; scarlet fever, 1; total number of infectious diseases, 5.

MALINTA, HENRY COUNTY.

Population, 357.

Person making report, M. M. Spangler, health officer.

Health officer, M. M. Spangler.

Clerk, Dr. Fiser.

Cases of infectious diseases reported: Diphtheria, 4; total number of infectious diseases, 4.

MANCHESTER, ADAMS COUNTY.

Population, 2,700.

Person making report, Dr. R. A. Stephenson, health officer.

Health officer, Dr. R. A. Stephenson.

Clerk, R. C. McNeil.

Cases of infectious diseases reported: Smallpox, 1; diphtheria, 2; scarlet fever, 1; typhoid fever, 2; whooping cough, 5; measles, 3; total number of infectious diseases, 14.

MANSFIELD, RICHLAND COUNTY.

Population, 20,000.

Person making report, A. H. McCullough, health officer.

Health officer, A. H. McCullough.

Clerk, D. S. Koontz.

Health department has been in bad shape during the greater part of this year. The legality of board was only decided by supreme court in October. Hope to be in better shape soon. We have no pesthouse here.

Cases of infectious diseases reported: Smallpox, 22; diphtheria, 19; scarlet fever, 2; typhoid fever (only deaths have been reported), 4; measles, 54; other infectious diseases, chicken pox, 6; total number of infectious diseases, 107.

MARENGO, MORROW COUNTY.

Population, 275.

Person making report, A. L. Pegg, health officer.

Health officer, A. L. Pegg.

Clerk, Chas. Ramsey.

My report of the health laws is that I can find no fault with them.

Cases of infectious diseases reported: None.

MARIETTA, WASHINGTON COUNTY.

Population, 16,000.

Person making report, Dr. C. W. Race, health officer.

Health officer, C. W. Race, M. D.

Clerk, J. L. Mason, M. D.

The board of health has no special features to report, except that they have carried out the law impartially. There have been no special improvements in the sanitary conditions of the city. The board of health has the dairies inspected twice a year and the milk tested at various times for the percentage of butter fats, etc. Meat markets and slaughter houses are also subjected to inspection. Permits are issued to milk men and proprietors of meat, game, and fish markets, twice a year, if after examination they are found sanitary. There has been no change made, during the year with respect to the collection of garbage. We have had no special difficulty in enforcing the new code. We have used the tent system for the care of smallpox cases.

Cases of infectious diseases reported: Smallpox, 53; diphtheria, 17; membranous croup, 1; scarlet fever, 14; typhoid fever, 23; measles, 40; other infectious diseases, scabies, 1; total number of infectious diseases, 149.

MARION, MARION COUNTY.

Population, 15,000.

Person making report, E. H. Raffen-sperger, clerk.

Sanitary officer, Jas. P. Lutz.

Clerk, E. H. Raffen-sperger.

Cases of infectious diseases reported: Smallpox, 118; diphtheria, 14; membranous croup, 3; scarlet fever, 25; typhoid fever, 10; whooping cough, 2; measles, 248; other infectious diseases, chicken pox, 41; total number of infectious diseases, 461.

MARTINS FERRY, BELMONT COUNTY.

Population, 8,000.

Person making report, R. A. Lindemuth, health officer.

Health officer, R. A. Lindemuth.
Clerk, Jos. Hanes.

Our sewerage system is in good condition and is being improved each year. We think it is as good as any in the state. We believe our milk is A No. 1. We have no outlet for garbage this year. The past years, we have been burying it, our contract expires on July 1, 1904. So at the last election we submitted to the voters of our city the question of issuing bonds to build a crematory, but it was defeated badly. We have no hospital or pesthouse for smallpox. The new code works very well here.

Cases of infectious diseases reported: Smallpox, 6; diphtheria, 14; membranous croup, 5; scarlet fever, 2; typhoid fever, 27; whooping cough, 2; measles, 6; other infectious diseases, 1; total number of infectious diseases, 63.

MASSILLON, STARK COUNTY.

Population, 12,944.

Person making report, Thos. H. Seaman, health officer.

Health officer and acting clerk, T. H. Seaman.

Supplementary to the within report, I respectfully state that the past year has been such as to test the financial and moral powers of the board. On April 18th, 1903, smallpox was discovered to exist in five separate households, in different sections of the city. A family migrating from Kentucky had developed the disease and five other families, relatives of the Kentucky family, had visited their newly arrived relatives, and became infected. Each family, and still others, not relatives, also were stricken. Through the neglect of a physician, the diseases was not reported to the Board, and in a number of cases concealment made it difficult to locate the disease and the modified degree, in most cases, of the disease, further enhanced the difficulty of both discover-

ing the disease and preventing its spread among the people. Quarantines were promptly established, day and night guards, limit ropes, and medical supervision; followed at full convalescence, with complete disinfection of premises, clothing etc. In no case, following disinfection, was developed a single case. The campaign above ended May 26—23 cases. On July 7th, a case was discovered and promptly quarantined; on the 9th, two more; on the 11th, one more and thereafter almost daily, new cases, in different households, and different localities, were discovered and coincident we found that the disease had been called in nearly every case, chicken pox, and no reports made, and to make the situation aggravating, cases in four different families had been so treated as chicken pox, and upon subsequent personal inspection by the writer, the disease was discovered, even when two or three consecutive cases had run through to convalescence in each family, of course the task of locating and restraining the disease was rendered extremely difficult, but the second campaign ended September 19th, and I am pleased to say that the public mind has been so aroused in sympathy with the work of the board that physicians, and neighbors made haste to report cases, or suspicious circumstances, all of which were promptly investigated, and if a "case," promptly dealt with. Number of cases second campaign, 51. October 17th a case was found in a condition fully pustulated, and quarantined, followed by two other cases in the same family connection. This case was one of infection at a social gathering at Canton, and did not extend beyond those infected before we discovered the case. On November 29th, a case was found, quarantined and every precaution taken, and we are now free from the disease. The time and labor devoted to smallpox, so taxed our resources, both financial and physical that work in other directions, indicated by your

inquires was in a great measure foregone. New regulations relative to sanitary plumbing strictly enforced, and appreciated.

Cases of infectious diseases reported; Smallpox, 78; diphtheria, 31; membranous croup, 3; scarlet fever, 5; typhoid fever, 18; measles, 14; other infectious diseases, 4; total number of infectious diseases, 153.

MAUMEE, LUCAS COUNTY.

Population, 2,500.

Person making report, J. E. Wilcox, clerk.

Health officer, P. Hartman.

Clerk, J. E. Wilcox.

Cases of infectious diseases reported: Typhoid fever, 2; total number of infectious diseases, 2.

MECHANICSBURG, CHAMPAIGN COUNTY.

Population, 1,700.

Person making report, Dr. J. C. Hathaway, health officer.

Health officer, Dr. J. C. Hathaway.

Clerk, J. C. Hathaway.

There have been no important features of the work of this board during the past year; no regulations in regard to milk supply. Town is supplied mostly from two dairies, both of which are well regulated by excellent sanitation. Garbage and night-soil are collected by responsible parties. No difficulties with new code. We have no pesthouse or hospital.

Cases of infectious diseases reported: Typhoid fever, 3; total number of infectious diseases, 3.

MEDINA, MEDINA COUNTY.

Population, 2,300.

Person making report, A. Pomroy, health officer.

Health officer, A. Pomroy.

We have no hospital or pesthouse. From what our people say, I would think the new plan was very satisfactory.

Cases of infectious diseases reported: Diphtheria, 9; measles, 94; total number of infectious diseases, 103.

MELROSE, PAULDING COUNTY.

Population, 450.

Person making report, Thomas J. Meyers, health officer.

Health officer, Thomas J. Meyers.

The sanitary condition in our village is good. There is nothing new. We have good streets and everything is nice and clean. There is no sickness at present.

Cases of infectious diseases reported: None.

MENTOR, LAKE COUNTY.

Population, 900.

Person making report, J. W. Lowe, health officer.

Health officer, J. W. Lowe.

The work done by the health officer is as follows: Exercised a restraining influence over the owner of a slaughter house who is disposed to be lax and indifferent to the observance of sanitary conditions; investigated and found the cause of an outbreak of a measles epidemic to be due the fact that the family physician did not report the first cases and that he gave no orders to keep the children from school when in a condition to give the disease. The result was that the epidemic spread to neighboring towns and townships, seriously interfering with public schools. No new regulations in reference to the milk supply have been enforced but the necessity of it has presented itself. In-

vestigation has revealed some important and alarming irregularities. Information was received to the effect that one dairyman sending milk to the city of Cleveland sent milk from a diseased cow, which he soon afterwards had killed. The word came too late to do anything, but think he should be communicated with from some higher authority in order to be effective in preventing a repetition. Another dairyman sending large quantities of milk to Cleveland has one cow with a very offensive breath and emaciated. This cow is being milked and the milk sold with that of other cows. The one case is on the edge of the corporate limits and the other is just over the line. We have had no difficulty with the new health code. We have no hospital or pesthouse. The new plan of having a health officer in lieu of a board of health has been satisfactory thus far. We have improved the sanitary condition of the village by visiting every place where we had a good reason to suspect that it was not in a healthy condition and gave orders as to what should be done and afterwards seeing that such orders were carried out.

Cases of infectious diseases reported: Typhoid fever, 2; measles, 52; total number of infectious diseases, 54.

would suggest that the joint meetings of the state and local boards of health be held in October instead of January.

Cases of infectious diseases reported: Smallpox, 18; scarlet fever, 13; typhoid fever, 1; whooping cough, 1; total number of infectious diseases, 33.

MIDDLEPORT, MEIGS COUNTY.

Population, 3,300, estimated.

Person making report, David Sisson, health officer.

Health officer, David Sisson.

Clerk, E. P. Cartwright.

None but routine work was done during the year, except the stamping out of two threatened epidemics of smallpox, which was duly reported at the time. The sewer system was increased to a considerable extent and quite a number of sanitary water closets were installed in both business and dwelling houses. No difficulty has been experienced in enforcing the new code. No hospital or pesthouse has been established for the reception of smallpox patients.

Cases of infectious diseases reported: Smallpox, 7; total number of infectious diseases, 7.

MIAMISBURG, MONTGOMERY COUNTY.

Population, 4,000.

Person making report, Dr. A. H. Blossom, health officer.

Health officer, Dr. A. H. Blossom.

Clerk, W. S. Bookwalter.

Enforcement of present sanitary laws meeting with opposition of class of constitutional objectors. The milk requires no special supervision. Collection of garbage in the hands of council—unobjectionable. The new health code is incomplete—refer to letter concerning joint hospital. We

MIDDLETOWN, BUTLER COUNTY.

Population, 10,000.

Person making report, G. D. Lummis, clerk and health officer.

Health officer, G. D. Lummis.

Clerk, G. D. Lummis.

No new regulations during the year. Board meets first Friday in every month, and there has been no meeting during the past year without a quorum—a good record. No difficulty in enforcing laws. Total expenses for 1903, \$1,030.29; cost of smallpox for 1903, \$223.82. Have no hospital or pesthouse.

Cases of infectious diseases reported: Smallpox, 8; diphtheria, 10; membranous croup, 2; scarlet fever, 5; total number of infectious diseases, 25.

MILAN, ERIE COUNTY.

Population, 700.

Person making report, Fred Collman, health officer.

Health officer, Fred Collman.

Clerk, Fred Roberts.

Cases of infectious diseases reported: Whooping cough, 2; total number of infectious diseases, 2.

MILFORD, CLERMONT AND HAMILTON COUNTIES.

Population, 1,200.

Person making report, Con. W. Gatch, M. D., health officer.

Health officer, Con. W. Gatch, M. D.

During 1903 great improvement has been made in collecting garbage. The dump in corporation limits has been abolished by us, and dumping grounds secured below village proper. No dead animal is allowed buried within village limits. Milk supply not investigated on account of no laboratory for chemical examination. The new health code established except slaughter houses and pig pens still remain. Have no hospital or pesthouse. Quarantine in diphtheria, etc., rigidly enforced, measles, etc., placarded. The substitution of a health officer in lieu of a board of health has worked for great good. Council is to be thanked for hearty co-operation. The sanitary condition of the town is greatly improved, and the work only started.

Cases of infectious diseases reported: Diphtheria, 1; scarlet fever, 1; other infectious diseases, 10; total number of infectious diseases, 12.

MILFORD CENTER, UNION COUNTY.

Population, 1,000.

Person making report, J. W. Perkins, health officer.

Health officer, J. W. Perkins.

Cases of infectious diseases reported: Diphtheria, 1, measles, 1; total number of infectious diseases, 2.

MILLEDGEVILLE, FAYETTE COUNTY.

Population, 201.

Person making report, W. T. Matthews, health officer.

Health officer, W. T. Matthews.

Clerk, A. U. Giddings.

Cases of infectious diseases reported: Whooping cough, 2; total number of infectious diseases, 2.

MILLERSBURG, HOLMES COUNTY.

Population, 2,000.

Person making report, Chas. A. Estell, health officer.

Health officer, Chas. A. Estell.

Clerk, C. D. Parkinson.

In answer to special inquiries would say that we have made no special improvement in sanitary condition in past year. Have encountered no serious difficulty in enforcing order of board. We have no hospital or pesthouse for smallpox patients. Have had no cases to look after. We have in past five or six weeks had an epidemic of measles. The disease has run its course and there have been no deaths. There were no cases reported by physicians as report shows.

Cases of infectious diseases reported: Scarlet fever, 2; total number of infectious diseases, 2.

MINERAL CITY, TUSCARAWAS
COUNTY.

Population, 1,600.

Person making report, C. C. White,
health officer.

Health officer, C. C. White.

Clerk, W. M. Tracy.

Cases of infectious diseases re-
ported: Smallpox, 2; diphtheria, 1;
typhoid fever, 1; total number of in-
fectious diseases, 4.

MINERAL RIDGE, TRUMBULL
COUNTY.

Population, 1,200.

Person making report, J. M. Elder,
health officer.

Health officer, J. M. Elder.

Clerk, J. F. Pearce.

Cases of infectious diseases re-
ported: Diphtheria, 4; scarlet fever, 2;
typhoid fever, 8; whooping cough, 21;
measles, 10; total number of infectious
diseases, 45.

MINGO JUNCTION, JEFFERSON
COUNTY.

Population, 2,800.

Person making report, Robert Mc-
Elroy, health officer.

Health officer, Robert McElroy.

Clerk, G. V. Sharp.

We have no pesthouse to which
smallpox patients may be removed.
Our sanitary conditions are better now
than they ever have been. We find
that it pays to see that filthy places
are kept clean. We have no diseases
of any kind at present.

Cases of infectious diseases re-
ported: Diphtheria, 8; total number of
infectious diseases, 8.

MINERVA, STARK AND CARROLL
COUNTIES.

Population, 1,200.

Person making report, Arthur Thom-
as, health officer.

Health officer, Arthur Thomas.

The health department was placed
in charge of a health officer instead
of a board. It was found impossible
to get sufficient number of members
interested to attend the meetings and
the work lagged. In a threatened epi-
demic the work was more likely to be
overdone than done or underdone. The
change meets approval. The code rec-
ommended by the state board was
adopted. No marked opposition has
yet appeared. We have no hospital or
pesthouse.

Cases of infectious diseases re-
ported: Typhoid fever, 1; other in-
fectious diseases, 2; total number of
infectious diseases, 3.

MINSTER, AUGLAIZE COUNTY.

Population, about 1,500.

Person making report, Christian
Meyer, health officer.

Health officer, Christian Meyer.

We have a dump for garbage. No
difficulties of the new health code.
We have no pesthouse. The mayor
and council say health officer is very
satisfactory.

MORRISTOWN, BELMONT COUNTY.

Population, 370.

Person making report, D. T. Phillips,
health officer.

Health officer, D. T. Phillips.

We did not get our health board
established until last fall, and our re-
port is meagre. There being no deaths
nor contagious diseases, and having re-
ported the typhoid cases promptly, I
felt that we had no report to make. I
assure you that it is not negligence and
I believe we are in better shape to

cope with these matters, than before. We are always glad to receive your suggestions and will endeavor to do our duty as respects the health and happiness of the community. We are improving somewhat in the way of cleaning up dirt and rubbish, and hope to do more in the spring.

Cases of infectious diseases reported: Typhoid fever, 3; total number of infectious diseases, 3.

MORROW, WARREN COUNTY.

Population, 900.

Person making report, Dr. A. J. Koeble, health officer.

Health officer, A. J. Koeble.

Clerk, E. Wilson.

The board hasn't done anything in particular. We found a place for garbage and had everything cleaned up in vicinity. In regards to reports of disease, we have none.

Cases of infectious diseases reported: None.

MT. BLANCHARD, HANCOCK COUNTY.

Population, 550.

Person making report, C. M. Walford, health officer.

Health officer, C. M. Walford.

Clerk, G. M. Fahl.

Cases of infectious diseases reported: Smallpox, 6; typhoid fever, 2; measles, 15; total number of infectious diseases, 23.

MT. GILEAD, MORROW COUNTY.

Population, 1,700.

Person making report, W. L. Case, health officer.

Health officer, W. L. Case.

Cases of infectious diseases reported: Diphtheria, 1; scarlet fever, 2; typhoid fever, 2; whooping cough, 3; total number of infectious diseases, 8.

MT. ORAB, BROWN COUNTY.

Population, 650.

Person making report, L. S. Vance, health officer.

Health officer, L. S. Vance.

Clerk, L. S. Vance.

Cases of infectious diseases reported: Typhoid fever, 1; measles, 1; total number of infectious diseases, 2.

MT. STERLING, MADISON COUNTY.

Population, 2,000.

Person making report, C. T. Gallagher, M. D., health officer.

Health officer, C. T. Gallagher, M. D.

Present plan of having health officer in lieu of board is very satisfactory. No great difficulty in enforcing orders. Mt. Sterling possesses a new and well-appointed pesthouse and used it to great advantage during the smallpox epidemic last winter. The water supply of Mt. Sterling is furnished from a drilled well 150 feet deep and the supply is abundant. We are now having a survey and plans made for a complete system of sewerage which we hope to have completed within a year. No regulations regarding milk or meat supply.

Cases of infectious diseases reported: Smallpox, 2; scarlet fever, 1; typhoid fever, 3; total number of infectious diseases, 6.

MT. WASHINGTON, HAMILTON COUNTY.

Population, 800.

Person making report, W. C. Langdon, health officer.

Health officer, W. C. Langdon.

Cases of infectious diseases reported: Scarlet fever, 8; whooping cough, 3; measles, 110; total number of infectious diseases, 121.

MURRAY CITY, HOCKING COUNTY.

Population, 1,300.

Person making report, T. J. Dillinger, health officer.

Health officer, T. J. Dillinger.

Clerk, R. Davidson.

The board of health of Murray City has held 12 meetings. It had every privy vault cleaned out or the old vault filled up and a new vault dug. The New Pittsburg Coal Co., cleaned out or dug a new vault for every privy they had in Murray City corporation. We had all the old manure hauled out of the corporation. We had all the paper and old rubbish burned. We made a general clean up of all the nuisances within limits of Murray City corporation. Everybody who uses milk keeps their own cows and furnishes their own milk. Yes, I have done everything but fight and arrest some of our patrons to enforce the law. We have no hospital or pesthouse in the corporation. We framed a full and complete code of health laws by which to govern our village. We do not have a perfectly righteous town, but I do not think any town of its size is in any better sanitary condition. I have received many anathemas and lost some practice, but I have stood for the law and right and I expect to so continue while I am health officer. It is a very ungrateful office, but I will stand by the sanitary laws and the eternal right.

Cases of infectious diseases reported: Diphtheria, 2; scarlet fever, 40; typhoid fever, 5; whooping cough, 4; measles, 60; chicken pox, 2; total number of infectious diseases, 111.

NAPOLEON, HENRY COUNTY.

Population, 4,284.

Person making report, D. H. Hancock, health officer and clerk.

Health officer, D. H. Hancock.

Clerk, D. H. Hancock.

There has been no material improvement in the sanitary condition of our village. No regulations have been enforced as regards milk supply or collecting garbage. I have not encountered many difficulties in the new health code where properly understood. We have no hospital or pesthouse where smallpox patients may be removed.

Cases of infectious diseases reported: Smallpox, 11; diphtheria, 9; scarlet fever, 42; typhoid fever, 5; whooping cough, 4; measles, 103; chicken pox, 21; total number of infectious diseases, 195.

NAVARRE, STARK COUNTY.

Population, 1,100.

Person making report, John Bailiss, health officer.

Health officer, John Bailiss.

Clerk, Kern Ackerman.

The village is in good sanitary condition. I have no trouble in enforcing rules and regulations of the board. We have no hospital or pesthouse, but could handle cases in any emergency.

Cases of infectious diseases reported: Measles, 30; total number of infectious diseases, 30.

NELSONVILLE, ATHENS COUNTY.

Population, 6,500.

Person making report, N. Hill, health officer and clerk.

Health officer, N. Hill.

Clerk, N. Hill.

We have met regularly the last Friday of each month, and have had

many called meetings as conditions required. We have enforced sanitary measures the best we could, and our city is in good shape at present. No new regulations have been enforced in regard to milk supply or collection of garbage. We have garbage put in barrels and boxes and hauled off to dumping ground for that purpose.

The city council made a motion to remove the new board of health, but the board would not go. Present members are serving until their terms expire and their successors are appointed and confirmed.

We have a pesthouse.

Cases of infectious diseases reported: Smallpox, 19; diphtheria, 4; scarlet fever, 63; typhoid fever, 2; measles, 102; total number of infectious diseases, 190.

NEVADA, WYANDOT COUNTY.

Population, 1,000.

Person making report, H. E. Dwire, M. D., health officer.

Health officer, H. E. Dwire, M. D.

Cases of infectious diseases reported: Scarlet fever, 5; typhoid fever, 2; total number of infectious diseases, 7.

NEVILLE, CLERMONT COUNTY.

Population, 400.

Person making report, A. Franco Joseph, M. D., health officer.

Health officer, A. Franco Joseph, M. D.

We have no hospital or pesthouse for smallpox cases; something I deem very essential.

Have had no considerable trouble in enforcing the new health code. Everything so far works agreeably.

Cases of infectious diseases reported: None.

NEWARK, LICKING COUNTY.

Population, 22,500.

Person making report, Henry Day, M. D., health officer.

Health officer, Henry Day.

Clerk, Frank T. Mauroth.

No improvements were made for the year 1903. We maintain the dumping ground, where rubbish is carried and garbage buried.

No regulations enforced as to milk supply. Have had no difficulty in enforcing the new health code.

We have no pesthouse, strictly speaking. We employ Wm. Sasser and wife at a salary of \$5 a day, they taking in all cases of smallpox, nursing and caring for them at their residence at the edge of the city and away from all other houses.

Total number of births reported since May, 1903, when order of new code went into effect (May 1 to December 31, 1903), 227; average for year, 336.

Total number of deaths during entire year, 220, or 9.8-10 per cent. per 1,000 of population, this being among the very lowest death rates in the state.

Total number of contagious diseases, 94; as follows: Smallpox, 35 cases, deaths 3; diphtheria, 28 cases, deaths 1; scarlet fever, 28 cases, deaths 0; membranous croup, 3 cases, deaths 3. These are the more severe contagious diseases which have been carefully reported. Those of typhoid fever, measles, whooping cough, chicken pox and tuberculosis, not required by State Board of Health, have not been reported.

Privies cleaned and removed, beginning with new code, May 4, 1903, to December 31, 1903, 250; houses fumigated, 78; visits to city prison, 41; number of examinations, board of public safety, 31. No account was kept of the number of nuisances reported and abated, which were numerous.

During the year 1903 there were 35 cases of smallpox cared for with a

total cost, per case, for medical service of \$18.00. The epidemic was prevalent during the months of January, February, March and April. Several of the cases were treated at their homes, causing a greater expense for physicians' care.

During May, June, July and August there were no cases in the city, but in September a B. and O. case arrived from Garret, Indiana, and was cared for at the residence of Mr. Sasser. There were no cases developed from this one. In October we had no cases and in November a case, bringing the disease from Cambridge, Ohio; from this time on three other cases developed from this one case, which were cared for at Mr. Sasser's residence.

The three in December came from Cambridge, Ohio. All were moved to Mr. Sasser's residence with no further cases.

The remaining expenses were for drugs, nursing, groceries and fuel, and are on record with the clerk of the board of health.

Cases of infectious diseases reported: Smallpox, 35; diphtheria, 28; membranous croup, 3; scarlet fever, 28; typhoid fever, not reported; whooping cough, not reported; measles, not reported; total number of infectious diseases, 124.

NEW BREMEN, AUGLAIZE COUNTY.

Population, 2,700.

Person making report, E. M. Phelps, M. D., health officer.

Health officer, E. M. Phelps, M. D.

The health of the town has been very good, considering the way that quarantine was kept up before I was appointed health officer. The epidemic of scarlet fever occurred before I was appointed, and at that time the houses were carded, but people went in and out just the same. The measles came after school was out. I did not

quarantine the parents but kept the children in their own yards, and they told people that they had measles and if they went in then it was at their own risk. They have never had a strict quarantine here and do not like it, but I had a case of scarlet fever last week and the entire family is now quarantined and the house carded, and I don't think it will spread as no one else was exposed that I could find, and I questioned the family closely. Have enforced rules as to building of closets and keeping same clean and free from odors; and also as to throwing garbage and dirt in alleys and streets and same were in good condition, especially during the hot months.

The general health was better and the sick and death rate lower this year than for several years previous.

We have no pesthouse here, but in case smallpox breaks out will get a house outside of corporation and put them in, or else establish a strict quarantine on the house where patients are. The health officer instead of the board has been successful here so far. The town is not very large and with but one officer there is no chance for difference of opinion and no need of calling meetings when something is to be done.

Cases of infectious diseases reported: Scarlet fever, 30; typhoid fever, 1; measles, 30; total number of infectious diseases, 61.

NEWBURG, CUYAHOGA COUNTY.

Population, 5,000.

Person making report, C. L. McCoy, M. D., health officer.

Health officer, C. L. McCoy, M. D.

Clerk, Ed. Stoneman.

We have difficulty in getting doctors to report their cases of contagious or infectious diseases and births and deaths.

We have a pesthouse for smallpox patients.

We aim to keep track of every case of contagious or infectious disease and thoroughly disinfect premises occupied by patients suffering from such disease. This and the effectual cleaning of closets, pools, stables and such like constitute the most important features of our work.

Our board is composed of five members. We have three sanitary patrolmen who do their work reasonably well. Much better service could be had, I imagine, if they worked according to special orders from the board or health officer. As it is, they present bills for payment for work done, such as burying dead dogs, cats and other dead animals or fowls, when such work is not ordered by any member of the board or health officer, and in reality it is not known that such work exists outside the imagination, yet the money is paid over to them without question. It strikes me this is a weak place that ought to be remedied. Neither the health officer nor any member of the board knows in the great majority of instances whether a dog was or was not buried; they only take the patrolman's word for it, and this has led one of our patrolmen to report many "funerals" over his way—in the dog and cat line. Please give us a better working formula.

The law requires the clerk of health board to keep a record of births, deaths and contagious diseases reported to the health officer. Our clerk does not have such a record. I spoke to him in regard to it, but so far it has had no effect. Suggest a remedy for such indifference. I might add that our clerk serves without pay, and yet he is compelled to use not a little of his own money to pay postage on mail that is used in behalf of the city. Our board does not seem to be in good working "trim." Things are done in too much of a haphazard way.

Cases of infectious diseases reported: Diphtheria, 4; scarlet fever,

1; typhoid fever, 6; measles, 2; chicken pox 6; total number of infectious diseases, 18.

NEW CARLISLE, CLARK COUNTY.

Population, 1,000.

Person making report, Wm. O. Higgins, health officer.

Health officer, Wm. O. Higgins.

Cases of infectious diseases reported: Scarlet fever, 1; total number of infectious diseases, 1.

NEWMCOMERSTOWN, TUSCARAWAS COUNTY.

Population, 3,000.

Person making report, Wm. Tidrick, health officer.

Health officer, Wm. Tidrick.

Clerk, H. G. Muehlhaus.

Some improvements in the way of sewerage have been made. No difficulties have been encountered in enforcing the new health code. We have no hospital or pesthouse.

Cases of infectious diseases reported: Scarlet fever, 12; typhoid fever, 4; measles, 6; total number of infectious diseases, 22.

NEW CONCORD, MUSKINGUM COUNTY.

Population, 800.

Person making report, Henry McCreary, M. D., health officer.

Health Officer, Henry McCreary, M. D.

On the 22nd of January smallpox was discovered. Strict quarantine was at once enforced and maintained 47 days. The churches and schools were closed, all except Muskingum college, in which there was no outbreak. Vaccination was generally attended to.

The disease did not spread beyond those who had been exposed and members of their families quarantined with them. Thirteen cases in all occurred, all of whom recovered. Careful disinfection of dwellings and school rooms with formaldehyde and the burning of bedding and clothing was done with quite satisfactory results.

No improvements have been made in the sanitary condition, nor with regard to milk supply, garbage, etc. No difficulties have been encountered in regard to the new code. We have no hospital.

Cases of infectious diseases reported: Smallpox, 13; total number of infectious diseases, 13.

NEW HOLLAND, PICKAWAY COUNTY.

Population, 900.

Person making report, T. W. Doyle, health officer and marshal.

Health officer, T. W. Doyle.

Cases of infectious diseases reported: Scarlet fever, 3; typhoid fever, 2; mumps, 50; total number of infectious diseases, 55.

NEW LEBANON, MONTGOMERY COUNTY.

Person making report, Lutie Piatt, health officer.

Health officer, Lutie Piatt.

There have been no improvements made and no reason to enforce any regulations. We have no pesthouse. The new plan has given satisfaction.

Cases of infectious diseases reported: None.

NEW LONDON, HURON COUNTY.

Population, 1,400.

Person making report, A. M. Turner, health officer.

Health officer, A. M. Turner.

Clerk, Wm. Whitney.

Aside from the strict enforcement of our sanitary laws our board has had no specially important features for 1903.

Hogs are not allowed to be kept within the corporation limits, only by permit, and only one permit of this sort has been given.

New sewers have been constructed and the village has passed an ordinance forbidding the dumping of rubbish of any sort in the streets, or the putting of slops, etc., in the sewers of the town. Strict enforcement of sanitary rules concerning hotel premises has been the rule.

The garbage of the village is taken out of the corporation limits to a place recently purchased by the municipality for this purpose.

We have experienced no difficulty in enforcing the new health code.

We have no pesthouse to which smallpox patients may be removed, but we would experience no special difficulty, we believe, in securing such a house if needed.

No regulations have been made in regard to the milk supply.

Cases of infectious diseases reported: Diphtheria, 4; typhoid fever, 3; total number of infectious diseases, 7.

NEW MATAMORAS, WASHINGTON COUNTY.

Population, 1,000.

Person making report, A. S. Miracle, health officer.

Health officer, A. S. Miracle.

Clerk, L. S. Hanshumaker.

We think we have smallpox entirely subdued and our best mode of fighting the disease was with vaccination, and from my observation I would advise it whenever there is any fear of the dis-

ease. Our physicians were very efficient.

Our sanitary condition is good. Water works and sewers are in good condition. The school is in a good healthy condition.

Cases of infectious diseases reported: Smallpox, 11; membranous croup, 2; typhoid fever, 21; whooping cough, 17; total number of infectious diseases, 51.

NEW PHILADELPHIA, TUSCARAWAS COUNTY.

Population, 6,500.

Person making report, George K. Peck, M. D., health officer.

Health officer, George K. Peck, M. D.

Clerk, John F. Denison.

There are no new regulations for collection of garbage.

We have no hospital or pesthouse to which smallpox patients may be removed.

Cases of infectious diseases reported: Smallpox, 1; diphtheria, 10; typhoid fever, 5; other infectious diseases, 10; total number of infectious diseases, 26.

NEW RICHMOND, CLERMONT COUNTY.

Population, 2,000.

Person making report, J. A. Windsor, M. D., health officer.

Health officer, J. A. Windsor, M. D. Clerk, H. M. Day.

No improvements have been made in the sanitary conditions of the village. We have had trouble with hog pens. During 1903 there were 84 hog pens with 224 head of hogs. The health board and village council refuse to pass an ordinance to regulate this nuisance.

There is nothing new in regard to the milk supply or garbage.

We have had no difficulty with the new health code.

We have no hospital or pesthouse.

Cases of infectious diseases reported: Smallpox 8; scarlet fever, 9; typhoid fever, 4; measles, 2; total number of infectious diseases, 23.

NEW RIEGEL, SENECA COUNTY.

Population, 340.

Person making report, Anthony Imber, health officer.

Health officer, Anthony Imber.

Clerk, M. Altwies.

Cases of infectious diseases reported: Typhoid fever, 3; measles, 6; total number of infectious diseases, 9.

NEW STRAITSVILLE, PERRY COUNTY.

Population, 3,000.

Person making report, D. D. Richards, health officer.

Health officer, D. D. Richards.

Cases of infectious diseases reported: Scarlet fever, 2; measles, 21; total number of infectious diseases, 23.

NEW VIENNA, CLINTON COUNTY.

Population, 800.

Person making report, Geo. R. Conrad, M. D., health officer.

Health officer, Geo. R. Conrad, M. D. My term as health officer began by appointment late in the year and during cold weather when there was but little for a health officer to do.

The sanitary condition of the village has been good. We have no hospital or pesthouse.

Cases of infectious diseases reported: None.

NEW WATERFORD, COLUMBIANA
COUNTY.

Person making report, A. J. Hayes,
health officer.

Health officer, A. J. Hayes.

Clerk, Luther Doubar.

Cases of infectious diseases re-
ported: Diphtheria, 1; total number
of infectious diseases, 1.

A competent oculist or optician
should be appointed to examine pupils
of public schools.

Cases of infectious diseases re-
ported: None.

NORTH BALTIMORE, WOOD
COUNTY.

Population, 3,500.

Person making report, J. W. Stoner,
health officer.

Health officer, J. W. Stoner.

Clerk, J. W. Stoner.

There has been no change in the
sanitary condition of the village, which
has been and is now very good.

No new regulations were made in
regard to milk supply, garbage, etc.

No special difficulty was encount-
ered in enforcing new health code.

We have no pesthouse. We had one
but sold it.

No meetings of the board have been
held since January, 1903.

The health officer is assisted by a
sanitary policeman.

Cases of infectious diseases re-
ported. Diphtheria, 9; typhoid fever,
5; whooping cough, 2; other infectious
diseases, 12; total number of infec-
tious diseases, 28.

NEY, DEFIANCE COUNTY.

Population, 450.

Person making report, Dr. P. M.
Lehman, health officer.

Health officer, Dr. P. M. Lehman.

Clerk, John W. Garber.

Cases of infectious diseases re-
ported: Scarlet fever, 6; typhoid
fever, 6; total number of infectious
diseases, 12.

NORTH AMHERST, LORAIN
COUNTY.

Population, about 2,000.

Person making report, Washington
Foster, M. D., health officer.

Health officer, Washington Foster.

No improvements have been made
in the village. No regulations in re-
gard to milk supply, collection of gar-
bage, etc. Have had no trouble with
the new health code. We have no
hospital or pesthouse. Health officer,
in lieu of board of health, is satisfac-
tory.

To be able to make annual reports
correctly it is imperative that physi-
cians report all cases (contagious);
also, where a contagious disease ex-
ists and no physician is called, hold
the parents or those in charge liable,
as are physicians.

Sanitary cans are preferable to
privy vaults. Refuse is collected in
the night and burned.

NORTH ROBINSON, CRAWFORD
COUNTY.

Population, 200.

Person making report, Jas. E. Mor-
ton, health officer.

Health officer, Jas. E. Morton.

There have been no improvements
in the sanitary conditions of the vil-
lage.

We have adopted no new regulations
as to milk supply and garbage.

We have no hospital or pesthouse.

Cases of infectious diseases re-
ported: None.

NORWALK, HURON COUNTY.

Population, 8,000.

Person making report, Edgar Martin, health officer.

Health officer, Edgar Martin.

Clerk, Frank D. Wickham.

The city has constructed one large trunk sewer for the northwest portion of the city.

No new regulations concerning milk or garbage have been adopted.

We have a well built and fully equipped hospital for smallpox patients.

We have experienced no difficulty in enforcing the new code.

Cases of infectious diseases reported: Diphtheria, 2; membranous croup, 1; scarlet fever, 5; typhoid fever, 1; whooping cough, not reported; measles, 11; total number of infectious diseases, 20.

NORWOOD, HAMILTON COUNTY.

Population, 10,000.

Person making report, J. C. Cadwallader, health officer.

Health officer, J. C. Cadwallader.

Clerk, J. C. Cadwallader.

The board meets the first Monday of each month. The milk is tested at regular intervals by the health officer and sanitary inspector. A new officer has recently been elected and known as sanitary inspector and police. His duties are defined in the statutes, and he is quite an assistance to the health officer in investigating nuisances and complaints. The garbage has been regularly collected the past year by the city and dumped on the city dump. We use the Cincinnati pesthouse for smallpox cases and pay \$3.00 per day for each patient.

Owing to the new code there has been some difficulty in defining the various duties of the board of health

relative to plumbers and inspectors. The contract for removing garbage has been transferred this year to the board of public service, and they have not had sufficient time to let the contract.

I had all of the school buildings fumigated during the holiday vacation and think it a good plan, as some children have at times so slight a degree of infection that the parents do not recognize the trouble.

Cases of infectious diseases reported: Smallpox, 5; diphtheria, 14; membranous croup, 2; scarlet fever, 45; typhoid fever, 8; whooping cough, 10; measles, 15; total number of infectious diseases, 99.

NOTTINGHAM, CUYAHOGA COUNTY.

Population, 800.

Person making report, Dr. W. O. Jenks, health officer.

Health officer, Dr. W. O. Jenks.

Clerk, W. L. Stacey.

Cases of infectious diseases reported: Typhoid fever, 10; whooping cough, 4; measles, 2; total number of infectious diseases, 16.

OAKHARBOR, OTTAWA COUNTY.

Population, about 1,600.

Person making report, S. D. Allen, M. D.

Health officer, S. D. Allen, M. D.

Clerk, W. A. Campbell.

We have no pesthouse or hospital.

Cases of infectious diseases reported: Smallpox, 21; diphtheria, 1; whooping cough, 5; chicken pox, 2; total number of infectious diseases, 29.

OAKWOOD, PAULDING COUNTY.

Population, 600.

Person making report, Allen Bidlack, health officer.

Health officer, Allen Bidlack.

Everything is in good order.

We have made no improvements, none required. The garbage is collected.

The new health code is a success here.

We have no pesthouse.

Cases of infectious diseases reported: Measles, 2; total number of infectious diseases, 2.

OBERLIN, LORAIN COUNTY.

Population, 4,082.

Person making report, E. L. Burge, health officer.

Health officer, E. L. Burge.

Cases of infectious diseases reported: Smallpox, 1; diphtheria, 1; typhoid fever, 13; whooping cough, 2; measles, 71; total number of infectious diseases, 88.

OLMSTED FALLS, CUYAHOGA COUNTY.

Population, 400.

Person making report, H. B. Northrop, health officer.

Health officer, H. B. Northrop.

No improvements have been made in the sanitary condition of the village.

No new regulations were made in regard to milk or garbage.

We have had no trouble in enforcing the new health code so far.

We have no hospital or pesthouse. I think the new plan all right. I would suggest the advisability of establishing an emergency pesthouse in every town and village.

Cases of infectious diseases reported: None.

ORRVILLE, WAYNE COUNTY.

Population, 2,200.

Person making report, Dr. A. A. Brooks, health officer.

Health officer, Dr. A. A. Brooks.

Clerk, J. B. Heffelman.

Our town is in a good sanitary condition. Streets and alleys are kept unusually clean. In the business section of the town a man devotes his entire time to street cleaning.

No regulations regarding our milk supply have been enforced. Garbage is collected and removed to the outskirts of town.

We have encountered no difficulty in enforcing the new health code.

We have no hospital or pesthouse for smallpox patients.

A thorough system of sewerage is our only essential to a complete sanitary condition.

Cases of infectious diseases reported: Diphtheria, 1; scarlet fever, 3; typhoid fever 8; total number of infectious diseases, 12.

OSBORN, GREENE COUNTY.

Population, 900.

Person making report, Ora Beakler, health officer.

Health officer, Ora Beakler.

Cases of infectious diseases reported: Scarlet fever, 4; typhoid fever, 1; total number of infectious diseases, 5.

OSGOOD, DARKE COUNTY.

Population, 300.

Person making report, W. F. Davidson, health officer.

Health officer, W. F. Davidson.

Clerk, G. E. Deweese.

We have no hospital or pesthouse.

Cases of infectious diseases reported: Whooping cough, 15; measles, 20; total number of infectious diseases, 35.

OSNABURG, STARK COUNTY.

Population, 550.

Person making report, B. F. Criswell, health officer.

Health officer, B. F. Criswell.

Clerk, Clarence Mong.

The village is in good condition. The water in our village is very good and the general health is good. We have had no contagious diseases since I have been health officer. Our school is in good condition. We have a very good school. We have had two deaths since I took my office, and no births that I know of.

We have no hospital, but there is one in Canton, which is only five miles away. We have no pesthouse.

A great many of our people keep cows of their own, so the milk question does not bother us. Our town is thickly settled and covers a good deal of ground, so I have not much to do.

Cases of infectious diseases reported: None.

OSTRANDER, DELAWARE COUNTY.

Population, 401.

Person making report, G. E. Cowles, health officer.

Health officer, G. E. Cowles.

Clerk, D. C. Fay.

Cases of infectious diseases reported: Measles, 14; mumps, 11; to-

tal number of infectious diseases, 25. Report dates from latter part of 1903 only. Was appointed short time prior to this.

OTTAWA, PUTNAM COUNTY.

Population, 2,500.

Person making report, E. L. Tupper, health officer.

Health officer, E. L. Tupper.

Clerk, W. F. Wert.

Cases of infectious diseases reported: Diphtheria, 5; membranous croup, 3; scarlet fever, 2; typhoid fever, 9; measles, 3; other infectious diseases, 3; total number of infectious diseases, 25.

OTTOVILLE, PUTNAM COUNTY.

Population, 400.

Person making report, J. F. Ockuly, M. D., health officer.

Health officer, J. F. Ockuly.

Clerk, Henry Ernst.

Cases of infectious diseases reported: Typhoid fever, 2; measles, 102; total number of infectious diseases, 104.

OXFORD, BUTLER COUNTY.

Population, 2,300.

Person making report, W. E. Calohan, health officer.

Health officer, W. E. Calohan.

I have not changed any of the rules laid down by the late board of health as I could not see any way to better them. We have never had any cause to have milk examined as our dairymen are very particular about their dairies. The collected garbage is hauled off twice a week. We have no pesthouse as we have had no use for one as yet, but there are plenty of places that could be used for one. I

think if all villages and small towns would leave their board of health matters to one person it would be better for the town. This has been my experience.

Cases of infectious diseases reported: Scarlet fever, 2; total number of infectious diseases, 2.

PAINESVILLE, LAKE COUNTY.

Population, 5,024.

Person making report, S. A. Haskell, health officer.

Health officer, S. A. Haskell.

Clerk, S. A. Haskell.

The city is extending its sewer system and doing some paving which will help the sanitary conditions. No new regulations have been adopted in regard to milk venders or the collection of garbage. So far we have not had any difficulty in enforcing the new health code. We haven't any hospital or pesthouse, where smallpox patients can be taken. We are badly in need of a public dumping ground for garbage and refuse material.

Cases of infectious diseases reported: Diphtheria, 3; scarlet fever, 14; typhoid fever, 2; whooping cough, 2; measles, 185; total number of infectious diseases, 206.

PAYNE, PAULDING COUNTY.

Population, 1,600.

Person making report: Dr. J. E. Mulligan, health officer.

Health officer, J. E. Mulligan.

Cases of infectious diseases reported: Diphtheria, 1; scarlet fever, 7; typhoid fever, 5; measles, 200; total number of infectious diseases, 213.

PEEBLES, ADAMS COUNTY.

Population, 800.

Person making report, G. F. Thomas, health officer.

Health officer, G. F. Thomas.

There has been very little sickness in the village since my appointment. The greatest difficulty is getting physicians to report their cases.

Cases of infectious diseases reported: measles, 2; total number of infectious diseases, 2.

PERRYSBURG, WOOD COUNTY.

Population, 1,766.

Person making report, C. H. Van Norman, clerk.

Health officer, J. H. Hayes.

Clerk, C. H. Van Norman.

Cases of infectious diseases reported: Smallpox, 2; diphtheria, 1; membranous croup, 4; scarlet fever, 4; typhoid fever, 10; whooping cough, 4; measles, 10; other infectious diseases, 3; total number of infectious diseases, 38.

PIONEER, WILLIAMS COUNTY.

Population, 700.

Person making report, Benjamin Horner, health officer.

Health officer, Benjamin Horner.

Clerk, Wm. R. Holley.

Cases of infectious diseases reported: Measles, 2; total number of infectious diseases, 2.

PITTSBURG, DARKE COUNTY.

Population, 200.

Person making report, J. O. Starr, M. D., health officer and secretary.

Health officer, J. O. Starr, M. D.

Clerk, J. O. Starr, M. D.

The board has been organized recently. Has met with no difficulties. We have no hospital or pesthouse. We are not confronted with milk

supply or garbage question. The public water supply has been inspected and put in good condition. Systematic attention is directed to sanitary condition of privy vaults.

Cases of infectious diseases reported: Typhoid fever, 1; total number of infectious diseases, 1.

12 1 1

PLAIN CITY, MADISON COUNTY.

12 1 1

Population, 1,600.

Person making report, J. W. Latham, health officer.

Health officer, J. W. Latham.

Cases of infectious diseases reported: Whooping cough, 2; total number of infectious diseases, 2.

PLEASANT RIDGE, HAMILTON COUNTY.

Population, 1,100.

Person making report, C. W. Acomb, health officer.

Health officer, C. W. Acomb.

Our village since last May has been trying to get along with a health officer, in lieu of a board of health. How we shall succeed, our near future will tell; our past year has been healthful; our sanitary condition has been good; but the garbage question has not been solved, yet care is taken to dispose of it so that there is no violation of sanitary laws. Our village has a street commissioner whose main duty is to keep our streets in a cleanly condition which has been carried out to the letter. We have done nothing in regard to milk supply. Dairies from which our supply comes are in good condition. The question as to whether the plan of health officer appointed in lieu of a board of health has been satisfactory or not is rather difficult to answer. If I can judge by the past and the present I cannot observe any marked change. Our village is not

very large and we have had quite a number of the citizens in our local board from time to time and co-operation and endorsement of a health officer in his legal duties will always be approved.

Cases of infectious diseases reported: Scarlet fever, 2; measles, 1; total number of infectious diseases, 3.

PLYMOUTH, RICHLAND & HURON COUNTIES.

Population, about 1,100.

Person making report, George J. Searle, health officer.

Health officer, George J. Searle.

Clerk, Sam Bottenfield.

The board of health of Plymouth agreed to establish a rule that all nuisances should be reported in writing, thus saving much controversy and petty annoyance, all communications to be held in confidence. The only improvement (?) which has been made, is that done by the county commissioners, viz.: the establishment of a sewer under the guise of a covered ditch (said ditch has been in use for some time by citizens as a run for their waste water) against the protest of about twenty residents. Said ditch flows into the Huron river a short distance above where ice is cut for summer use. We are in a state of innocuous desuetude. It might awaken us to have an officer of the state board of health make us a visit. I am willing to confess my inability to cope with the situation. We have no hospital of any kind.

Cases of infectious diseases reported. None reported.

POLAND, MAHONING COUNTY.

Population, 500.

Person making report, C. R. Justice, health officer.

Health officer, C. R. Justice.

Council, some four years ago, abolished our local board of health. I have so reported each year, but I have continued to act without any salary since that time when any emergency required my service, as no one else has been appointed. As I understand the law I hold over until my successor is appointed and qualified. I have kept a general run of events. We have had no epidemics or anything requiring much attention, so the matter stands.

Cases of infectious diseases reported: Scarlet fever, 5; typhoid fever, 6; whooping cough, 40; measles, 2; total number of infectious diseases, 53.

POMEROY, MEIGS COUNTY.

Population, 4,300.

Person making report, R. E. Stobart, health officer.

Health officer, R. E. Stobart, M. D.

Cases of infectious diseases reported: Scarlet fever, 3; typhoid fever, 23; measles, 6; total number of infectious diseases, 32.

PORT CLINTON, OTTAWA COUNTY.

Population, 2,500.

Person making report, H. J. Pool, M. D., health officer.

Health officer, H. J. Pool, M. D.

Clerk, H. H. Hesselbart.

No improvements have been made in the sanitary condition of our village.

No new regulations have been enforced as regards the milk supply. Garbage is not collected.

We have not encountered difficulties in enforcing the new health code. We have no hospital or pest-house to which smallpox patients may be removed.

Cases of infectious diseases reported: Smallpox, 8; diphtheria, 1;

membranous croup, 1; scarlet fever, 7; typhoid fever, 2; epidemic of mumps, no record; total number of infectious diseases, 19.

PORTSMOUTH, SCIOTO COUNTY.

Population, 20,000.

Person making report, John W. Berndt, clerk.

Health officer, W. W. Smith, M. D.

Clerk, John W. Berndt.

We have had no special improvements in the sanitary condition of the city during the past year, nor have any regulations been enforced. We have never had any trouble in enforcing the new code. We have a hospital used exclusively for patients infected with contagious diseases.

Cases of infectious diseases reported: Smallpox, 41; diphtheria, 6; scarlet fever, 88; total number of infectious diseases, 135.

PROCTORVILLE, LAWRENCE COUNTY.

Population, 525.

Person making report, R. E. Atkinson, health officer.

Health officer, R. E. Atkinson.

Clerk, J. W. Reckard.

Cases of infectious diseases reported: Smallpox, 12; typhoid fever, 4; measles, 1; total number of infectious diseases, 17.

PROSPECT, MARION COUNTY.

Population, 1,100.

Person making report, G. F. Gast, health officer.

Health officer, G. F. Gast.

Clerk, A. Johnson.

The sanitary condition of village is good.

Cases of infectious diseases reported: Smallpox, 4; typhoid fever, 1; whooping cough, 2; other infectious diseases, chicken pox, 15; total number of infectious diseases, 23.

PUT-IN-BAY, OTTAWA COUNTY.

Population, 300.

Person making report, Adam Heidle, health officer.

Health officer, Adam Heidle.

Clerk, Carl Oelschlager.

Sanitary conditions have been improved by street sewer being built, sewer of Beebe House condemned and village council is considering the construction of a sewer draining the hotels on Delaware avenue. No new regulations on milk supply or garbage were made. We have no pesthouse.

Cases of infectious diseases reported: None.

QUAKER CITY, GUERNSEY COUNTY.

Population, 850.

Person making report, W. W. Dowdell, health officer.

Health officer, W. W. Dowdell.

Clerk, Robert Boyd.

We have no hospital or pesthouse.

Cases of infectious diseases reported: Smallpox, 1; scarlet fever, 4; typhoid fever, 4; total number of infectious diseases, 9.

QUINCY, LOGAN COUNTY.

Population, 900.

Person making report, G. B. Plummer, health officer.

Health officer, G. B. Plummer.

Clerk, I. W. Hedges.

Cases of infectious diseases reported: Membranous croup, 12;

whooping cough, 12; measles, 25; total number of infectious diseases, 49.

RACINE, MEIGS COUNTY.

Population, 400.

Person making report; Elwood Davis, health officer.

Health officer, Elwood Davis.

The death rate in this village is very small. There has not been a case of a contagious disease reported during my time in office. There has been no improvement made in the village in regard to the sanitary condition. In regard to the milk supply and garbage there has not been any thing done—it has not been necessary. In regard to the new health code, I have no trouble, except Sec. 16. "No live hog or hogs shall be kept within the village more than twenty-four (24) hours, between the months of April and November." We have no pesthouse or hospital within the village. The new plan has been satisfactory.

Cases of infectious diseases reported: None.

RAVENNA, PORTAGE COUNTY.

Person making report, F. A. Chamberlain, health officer.

Health officer, F. A. Chamberlain.

Clerk, C. M. Waller.

Cases of infectious diseases reported: Diphtheria, 5; typhoid fever, 5; total number of infectious diseases, 10.

RAWSON, HANCOCK COUNTY.

Population, 500.

Person making report, Mike Smith, health officer.

Health officer, Mike Smith.

Clerk, D. Martz.

Cases of infectious diseases reported: Typhoid fever, 3; measles, 1; total number of infectious diseases, 4.

READING, HAMILTON COUNTY.

Population, 3,700.

Person making report, George Siebel, health officer.

Health officer, George Siebel.

Clerk, John Miegand.

We have no hospital or pesthouse for smallpox patients. We have improved conditions by making citizens keep a receptacle for garbage, and one for ashes. The village is kept clean and there is no cause for complaint. I would suggest that the state board of health should take some action in making a law to have the village health officer to test the milk every month. Milk here is inspected about once a year.

Cases of infectious diseases reported: Diphtheria, 7; scarlet fever, 5; measles, 1; total number of infectious diseases, 13.

REPUBLIC, SENECA COUNTY.

Population, 500.

Person making report, Crayton E. Womer, health officer.

Health officer, C. E. Womer.

Clerk, Ed. Stinebaugh.

Sanitary conditions are good. No regulations relative to milk supply and garbage are deemed necessary, owing to the fact that no dairy business is conducted here. We have encountered no difficulty in enforcing the new code. We have no hospital or pesthouse.

Cases of infectious diseases reported: Whooping cough, 5; measles, 2; total number of infectious diseases, 7.

REYNOLDSBURG, FRANKLIN COUNTY.

Person making report, B. F. Orem, health officer.

Health officer, B. F. Orem.

Cases of infectious diseases reported: Smallpox, 1; scarlet fever, 2; typhoid fever, 1; total number of infectious diseases, 4.

RICHWOOD, UNION COUNTY.

Population, 2,000.

Person making report, C. W. Sloop, health officer.

Health officer, C. W. Sloop.

Clerk, R. G. Cook.

Cases of infectious diseases reported: Scarlet fever, 2; typhoid fever, 1; measles, 3; total number of infectious diseases, 6.

RIDGEWAY, HARDIN COUNTY.

Population, 500.

Person making report, E. B. Crow, health officer.

Health officer, E. B. Crow.

Clerk, Forrest Newell.

The sanitary conditions, ice and milk supply, disposition of garbage, water used and general conditions being satisfactory, no changes were made. We have had no difficulty in enforcing new code. We have no pesthouse.

Cases of infectious diseases reported: None.

RISING SUN, WOOD COUNTY.

Population, 700.

Person making report, M. C. Mowen, health officer.

Health officer, M. C. Mowen.

Clerk, Chas. Sheffler.

Very little improvements have been made in the sanitary condition of our village. The council will not furnish place to dump garbage. We have no hospital or pesthouse.

Cases of infectious diseases reported: Smallpox, 10; typhoid fever, 2; whooping cough, 3; measles, 2; total number of infectious diseases, 17.

ROCKFORD, MERCER COUNTY.

Population, 1,207.

Person making report, S. J. Robinson, secretary.

Clerk, S. J. Robinson.

I was appointed to fill a vacancy on the board in November. I find the physicians have failed to make any report to the board of births, deaths, or contagious diseases. The board met on the 18th of December to determine the condition of the ice that was being put up from the St. Mary's River. The board condemned the ice and served notice on those storing it to not sell it for domestic purposes.

Cases of infectious diseases reported: None.

ROCKPORT, CUYAHOGA COUNTY.

Population, estimated, 2,400.

Person making report, Chas. L. Wood, M. D., health officer.

Health officer, Chas. L. Wood, M. D. Clerk, W. L. Nichols.

There have been no improvements made in the sanitary conditions of village. The milk supply and garbage remain the same. We have had no trouble with the new code. We have no hospital or pesthouse—cases are sent to city of Cleveland. The new plan is satisfactory here.

Cases of infectious diseases reported: Smallpox, 1; diphtheria, 8; measles, 2; total number of infectious diseases, 11.

ROCKY RIVER, CUYAHOGA COUNTY.

Population, 1,200.

Person making report, K. K. Hastings, health officer.

Health officer, K. K. Hastings.

No new regulations have been enforced as regards milk supply, collection of garbage, etc. Have had no difficulties in enforcing new code. Physicians are a little slow in making reports of deaths and births, but I think they will do better. We have no hospital or pesthouse for smallpox cases. The new plan is satisfactory as far as I have had occasion to observe.

Cases of infectious diseases reported: Diphtheria, 2; scarlet fever, 2; total number of infectious diseases, 4.

ROGERS, COLUMBIANA COUNTY.

Population, 290.

Person making report, George N. McCamon, health officer.

Health officer, George N. McCamon.

Cases of infectious diseases reported: Typhoid fever, 9; total number of infectious diseases, 9.

ROSEVILLE, MUSKINGUM COUNTY.

Population, 1,500.

Person making report, T. C. Hilliard, health officer.

Health officer, T. C. Hilliard.

We have had 32 vaults cleaned this year, something that was never done before. We have given permission to build eight privy vaults. We have served eight written and about one hundred verbal notices to abate nuisances. We have issued fifteen permits to bury in Roseville cemetery.

Cases of infectious diseases reported: None.

RUSHVILLE, FAIRFIELD COUNTY. 15; measles, 30; total number of infectious diseases, 49.

Population, 400.

Person making report, Dr. W. C. Lewis, health officer.

Health officer, Dr. W. C. Lewis.

Clerk, Dr. C. A. Chapman.

Our village is situated on quite an elevation; about 200 feet above the stream—Rush Creek—that runs along the valley below and parallel with the T. & O. C. R. R. Our drainage is, of course, good. Water for drinking and cooking purposes is obtained from wells from 30 to 80 feet deep. There is nothing new in the way of sanitation here. We have no pesthouse for small-pox patients. Fortunately we have had no cases as yet. We get good fresh milk within the corporate limits. Privy vaults are kept clean, and garbage of all kinds is burned. The council has a committee which acts with the health officer when necessary. We have had no trouble in enforcing the law so far. It might be different if we had zymotics to contend with. The great difficulty is in enforcing quarantine in small towns and villages. However, in cases of diphtheria, scarlet fever, smallpox, etc., we should do our utmost to enforce the law and the large majority of our citizens would assist the health officer in this direction, should it become necessary.

Cases of infectious diseases reported: Membranous croup, 1; whooping cough, 5; total number of infectious diseases, 6.

RUSHSVLVANIA, LOGAN COUNTY.

Population, 650.

Person making report, Willis H. Drumm, health officer.

Health officer, W. H. Drumm.

Clerk, Fred Carahoof.

Garbage is carted out of town.

Cases of infectious diseases reported: Smallpox, 1; membranous croup, 1, typhoid fever, 4; whooping cough,

SABINA, CLINTON COUNTY.

Population, 1,600.

Person making report, Dr. S. B. Lightner, health officer.

Health officer, Dr. S. B. Lightner.

I did not receive my appointment of health officer until September 1, so my report dates from that time. No improvements have been made in the sanitary condition of the village. No regulations were enforced as regards milk supply or collection of garbage. I have had no difficulty in enforcing the new health code. We have no hospital or pesthouse. The health officer in lieu of a board of health has been satisfactory so far as I know.

Cases of infectious diseases reported: Diphtheria, 1; membranous croup, 1; total number of infectious diseases, 2.

ST. BERNARD, HAMILTON COUNTY.

Population, 2,500.

Person making report, A. C. Bopie, M. D., health officer.

Health officer, A. C. Bopie, M. D.

Clerk, T. Meyer.

The village has a sewerage system. Smallpox patients are sent to the Cincinnati pesthouse.

Cases of infectious diseases reported: Diphtheria, 1; membranous croup, 1; scarlet fever, 2; typhoid fever, 3; measles, 25; total number of infectious diseases, 32.

ST. CLAIRSVILLE, BELMONT COUNTY.

Population, approximately, 1,500.

Person making report, S. L. West, health officer.

Health officer, S. L. West.

Cases of infectious diseases reported: Smallpox, 1; diphtheria, 6; membranous croup, 1; typhoid fever, 6; total number of infectious diseases, 14.

ST. MARYS, AUGLAIZE COUNTY.

Population, 6,500.

Person making report, I. E. Williams, M. D., health officer.

Health officer, I. E. Williams, M. D. Clerk, J. F. Stout.

Cases of infectious diseases reported: Smallpox, 3; diphtheria, 5; scarlet fever, 12; total number of infectious diseases, 20.

ST. PARIS, CHAMPAIGN COUNTY.

Population, 1,300.

Person making report, C. A. Offenbacher, M. D., health officer.

Health officer, C. A. Offenbacher.

Clerk, C. A. Offenbacher.

Cases of infectious diseases reported: Typhoid fever, 1; total number of infectious diseases, 1.

SALEM, COLUMBIANA COUNTY.

Population, 8,000.

Person making report, Dr. E. J. Schwartz, health officer.

Health officer, Dr. E. J. Schwartz.

Clerk, Dr. E. J. Schwartz.

This year we have employed a competent dairy and food inspector, paying him by the hour. He has inspected the dairies, butcher shops and slaughter houses and, semi-annually, issued certificates of inspection to same. This feature of our work has been a great improvement over recent years, as it insures citizens pure milk

and cleanly butcher shops and slaughter houses. We have also compelled butchers to provide themselves with air-tight garbage cans in which to place offal and scraps and to be taken away daily. We have no regular pesthouse for smallpox patients. We have no regular system for collection and disposal of garbage. Lack of funds prevent us from supplying ourselves with a pesthouse and putting into operation a garbage disposal which is very badly needed.

Our board has succeeded in abating two swamps or marshes within our city limits, which have been a great nuisance for years. We have had seven cases of smallpox which we feel have been handled successfully, as there was no further spread after great exposure that seemed to point to an epidemic.

As a system, Salem's sewers are not a success. The outlets to our sewers are not conducive to the health of the city. We also have some open creeks running through the city which are a menace to health.

The death record for 1903 is greatly increased over 1902. There were 117 deaths for 1903 against 62 for 1902. We had a great increase in typhoid deaths, accidental deaths and deaths from old age over the previous year. We had an average death rate of 14% to the 1,000 on a basis of 8,000 population, as to 7% to 1,000 in 1902. Served 257 notices, and 228 were abated. There were 156 births during the year. Expenditure for the year, \$2,119.26.

Cases of infectious diseases reported: Smallpox, 7; diphtheria, 2; membranous croup, 1; scarlet fever, 6; typhoid fever, 17; whooping cough, 1; measles, 3; total number of infectious diseases, 37.

SALESVILLE, GUERNSEY COUNTY

Population, 275.

Person making report, William T. Jarpen-ter, health officer.

Health officer, Wm. T. Carpenter.

Our village has no hospital or pest-house and I have had no trouble in enforcing the new laws. Our village is in a healthful condition.

Cases of infectious diseases reported: Typhoid fever, 1; whooping cough, 10; measles, 1; total number of infectious diseases, 12.

SALINEVILLE, COLUMBIANA COUNTY.

Population, 3,000.

Person making report, H. M. Calvin, M. D., health officer.

Health officer, H. M. Calvin, M. D.

Clerk, H. M. Calvin.

The street commissioner acts as sanitary police, but makes no report. The state board should do something towards furnishing the physicians blanks, upon which to report all deaths. I have to depend on the undertakers for my report.

Cases of infectious diseases reported: Smallpox, 5; diphtheria, 4; typhoid fever, 8; measles, 5; total number of infectious diseases, 22.

SANDUSKY, ERIE COUNTY.

Population, 23,000.

Person making report, W. H. Busch, M. D., health officer.

Health officer, W. H. Busch, M. D.

Clerk, Joe Lothe.

There were no special improvements made in the sanitary condition of the city during the past year. There were no new regulations made in regard to milk supply. A garbage plant has been discussed for the past six months and is at present before the city council for action. I have encountered no difficulties in enforcing the new health code. We have a pest-

house for smallpox patients.

Cases of infectious diseases reported: Smallpox, 9; diphtheria, 13; membranous croup, 1; scarlet fever, 18; typhoid fever, 50; measles, 2; other infectious diseases, chicken pox, 6; total number of infectious diseases, 99.

SCOTT, VAN WERT & PAULDING COUNTIES.

Population, 800.

Person making report, George W. Clifton, secretary of board.

Clerk, Geo. W. Clifton.

We have no pesthouse. All is satisfactory.

Cases of infectious diseases reported: Scarlet fever, 6; total number of infectious diseases, 6.

SEBRING, MAHONING COUNTY.

Population, 1,750.

Person making report, Frank Chisler, health officer.

Health officer, Frank Chisler.

Clerk, J. B. Klingensmith.

A survey has been completed for a sanitary sewer system. We have a smallpox hospital.

Cases of infectious diseases reported: Smallpox, 5; diphtheria, 1; membranous croup, 3; scarlet fever, 3; typhoid fever, 6; whooping cough, 55; measles, 21; other infectious diseases, 7; total number of infectious diseases, 101.

SENECAVILLE, GUERNSEY COUNTY.

Population, 800.

Person making report: Richard Lowry, health officer.

Health officer, Richard Lowry.

Clerk, Charles Lowry.

Cases of infectious diseases reported: Scarlet fever, 24; typhoid fever, 3; total number of infectious diseases, 27.

SHAWNEE, PERRY COUNTY.

Population, 2,966.

Person making report, Emerson Peart, health officer.

Health officer, Emerson Peart.

Clerk, B. G. Trew.

The important feature of our work has been the inspection of vaults, ditches, wells and accumulated garbage, which has greatly improved the sanitary condition of our village. The lack of proper sewerage leaves the sanitary condition of the town not as good as we would desire. We have no public milk supply or venders. All decayed garbage is ordered burned or buried. We have not encountered any opposition in enforcing the new health code; it works well here. We have no hospital or pesthouse. The new plan of appointing health officer in lieu of board of health, has been very satisfactory in our village.

We have served one hundred notices to clean vaults, wells and to abate other nuisances. Our people have mostly complied with the requirements. We have made the following recommendations to the council: That the streets, alleys and drains of our village be cleaned as early as possible, and that all cinder ditches be replaced with brick, and that our council have a garbage furnace built and hire a garbage collector from April 1st to October 31st of each year.

Cases of infectious diseases reported: None.

SHELBY, RICHLAND COUNTY.

Population, 4,800.

Person making report, A. C. Taylor, M. D., health officer.

Health officer, A. C. Taylor, M. D.

Clerk, H. A. Tucker.

All the milk dealers are compelled to use coupon milk tickets, which are used once and then thrown away. I think diseases are often transmitted where tickets are used time and again. Garbage is collected once a week. We have no difficulty in enforcing the new health code. We have a small pesthouse for smallpox patients.

Cases of infectious diseases reported: Smallpox, 1; diphtheria, 2; membranous croup, 7; scarlet fever, 4; typhoid fever, 6; whooping cough, 8; measles, 760; other infectious diseases, 40; total number of infectious diseases, 768.

SIDNEY, SHELBY COUNTY.

Population, 6,000.

Person making report, William C. Wyman, health officer.

Health officer, Wm. C. Wyman.

Clerk, Wm. C. Wyman.

There is nothing important, except the keeping of the city in a sanitary condition, which condition is as good as could be expected under the circumstances, the streets being broken up for paving, and the finishing of the sewer for surface water. In the matter of milk and meat I tried to collect but met trouble from the one-cow citizen, who thought he ought not to pay for a permit for selling his surplus milk, then again all the groceries are selling meat. I, therefore, stopped collecting until after the next meeting of the state and local boards. The sanitary officer and myself have kept all nuisances abated, and all houses disinfected where contagious diseases existed. We have no hospital or pesthouse. After the streets are paved, this city will be so that it can be kept in excellent condition. The board authorized me to keep the city in good

condition. The total expenditures for 1903 were \$454.35. Forty-eight permits issued at 50 cents each for sale of milk and meat; collected, \$24.00. Undertakers and embalmers licenses recorded, 5. One old house condemned as unfit for human habitation. 93 vaults emptied and several yards and cellars cleaned up, and all dwellings where consumption existed were well disinfected. On account of the public work going on in the city, I had fears of infectious diseases, there being so many strangers of all kinds here on the work, yet of the 15 cases of scarlet fever only one died. The five cases of diphtheria occurred in a family that was very weak and sickly. I had to taken them to a boarding house before I could disinfect the house and burned a large share of their goods at an expense of \$32.00.

Cases of infectious diseases reported: Diphtheria, 5; scarlet fever, 15; typhoid fever, 5; measles, 3; total number of infectious diseases, 28.

SMITHFIELD, JEFFERSON COUNTY.

Population, 600.

Person making report, Ross C. Moore, health officer.

Health officer, Ross. C. Moore.

Clerk, W. B. Naylor.

No improvements were made in the sanitary condition of the village. No new regulations were made in regard to the milk supply, collection of garbage, etc. I have not encountered difficulties in enforcing the new code. We have no pesthouse.

Cases of infectious diseases reported: Typhoid fever, 1; total number of infectious diseases, 1.

SMITHVILLE, WAYNE COUNTY.

Population, 474.

Person making report, H. A. Schollenberger, M. D., health officer.

Health officer, H. A. Schollenberger. Clerk, J. S. Shabler.

Cases of infectious diseases reported: Smallpox, 2; membranous croup, 1; scarlet fever, 30; typhoid fever, 1; total number of infectious diseases, 34.

SOMERVILLE, BUTLER COUNTY.

Population, 450.

Person making report, W. H. Leever, health officer.

Health officer, W. H. Leever.

The sanitary condition of the village is fairly good. There have been no improvements made. No new regulations in regard to milk supply or collection of garbage. We have had no difficulties in regard to the new code. We have no hospital or pesthouse. The corporation thinks having a health officer is the best plan.

Cases of infectious diseases reported: Measles, 8; chicken pox, 20; total number of infectious diseases, 28.

SOUTH BLOOMFIELD, PICKAWAY COUNTY.

Population, 250.

Person making report, Charles E. Blacker, M. D., health officer.

Health officer, Charles E. Blacker. M. D.

Clerk, Herman Peter.

There has not been a case of infectious disease within the year, nor has there been a meeting of the board. Last year those who put up ice got permission from the health officer, but this year none of them did. There was one complaint of an especially offensive privy, but there was no action taken on the subject. It is twelve years since the council had a thorough vaccination of the school children. In each of my annual reports

to council I tried to impress it with the folly of awaiting for the arrival of the epidemic. We have no dairy, but some half dozen families have about that number of occasional milk customers. There is no inspection made, but I am satisfied that the milk furnished is of a good quality.

Nature could hardly do more for a locality than she has done for us as to soil, subsoil, water supply and natural drainage. We have open privy vaults and pig pens, but our greatest danger lies in the total apathy and opposition of the citizens.

We have no pesthouse or hospital of any kind.

Cases of infectious diseases reported: None.

SOUTH CHARLESTON, CLARK COUNTY.

Population, 1,098.

Person making report, Washington Coss, health officer.

Health officer, Washington Coss.

Clerk, Will L. Wentz.

No improvements have been made in the sanitary conditions, and no new regulations have been enforced. We have neither a hospital nor a pesthouse.

Cases of infectious diseases reported: None.

SOUTH LEBANON, WARREN COUNTY.

Population, 550.

Person making report, A. D. Spence, M. D., health officer.

Health officer, A. D. Spence, M. D.

Cases of infectious diseases reported: Smallpox, 6; diphtheria, 18; membranous croup, 3; typhoid fever, 1; measles, 1; total number of infectious diseases, 29.

SOUTH POINT, LAWRENCE COUNTY.

Person making report, C. Wayne McCoy, health officer.

Health officer, C. Wayne McCoy.

Schools were discontinued for three weeks and all scholars were compelled to show certificate of recent successful vaccination before resuming attendance. Those not able to pay were vaccinated. Vaccination was practically universal and what threatened to become an epidemic of smallpox, was averted.

No special improvements in the sanitary condition of the village have been made, except in opening up and grading streets, thereby securing better drainage.

No regulations governing milk supply or collection of garbage have been enforced. Have had no difficulty in enforcing new health code. Have no hospital or pesthouse. The health officer in lieu of board of health seems to have proven satisfactory here.

Strongly in favor of law making vaccination compulsory.

Cases of infectious diseases reported: Smallpox, 3; typhoid fever, 3; whooping cough, 16; total number of infectious diseases, 22.

SOUTH ZANESVILLE, MUSKINGUM COUNTY.

Population, 549.

Person making report, B. A. Summers, health officer.

Health officer, B. A. Summers.

Clerk, T. P. Gilkerson.

Cases of infectious diseases reported: Smallpox, 1; Diphtheria, 1; membranous croup, 3; typhoid fever, 1; measles, 31; tonsillitis, 11; total number of infectious diseases, 48.

SPENCERVILLE, ALLEN COUNTY.

Population, 2,000.

Person making report, G. C. Schutz,
clerk of board of health.

Health officer, Fred Hirn.

Clerk, G. C. Schutz.

Cases of infectious diseases reported: Diphtheria, 1; scarlet fever, 2; measles, 1; total number of infectious diseases, 4.

which are in a very good sanitary condition. All garbage has been removed from the village. I have had no special trouble in enforcing the health code. We have no hospital or pesthouse. Health officer appointed instead of board of health seems to be giving general satisfaction.

Cases of infectious diseases reported: Typhoid fever, 6; total number of infectious diseases, 6.

SPRINGFIELD, CLARK COUNTY.

Population, estimated 45,000.

Person making report, Henry H. Seys, health officer.

Clerk, Chas. C. Bauer.

No special improvements have been made in sanitary conditions of the city. We have made no change in milk or garbage regulations. We have had no difficulty in enforcing new health code. We have a pesthouse.

I regard the present system of having a special health board, distinct from board of public service, as decidedly an improvement.

Cases of infectious diseases reported: Smallpox, 54; diphtheria and membranous croup, 30; scarlet fever, 43; measles, 59; total number of infectious diseases, 186.

STEUBENVILLE, JEFFERSON COUNTY.

Population, 20,000.

Person making report, John Welch, health officer.

Health officer, John Welch.

Clerk, W. S. McCausland.

The sanitary condition of the city has been much improved by way of cleaning streets and alleys; by cleaning vaults and cess pools. We have additional sewerage in parts of our city, and property owners have connected with same.

We became suspicious of our milk supply, and sent to State Dairy and Food Commissioner for instructions. A milk inspector was sent here, and on his arrival we gave him all assistance. He procured fourteen samples of milk from as many different dairies. The samples were analyzed, and our suspicions were proven facts. Three of the dairymen were prosecuted for delivering and selling adulterated milk. This, no doubt, had a tendency to better our milk supply. We have no system for collection of garbage. We have had no trouble in enforcing the new health code. We have a good hospital for smallpox patients, located two miles from city. We have no record as to births, deaths, or marriages, as the law requiring such reports to be made by physicians or ministers is without a penalty, they refuse to report.

SPRING VALLEY, GREENE COUNTY.

Population, 600.

Person making report, Dr. S. E. Dyke, health officer.

Health officer, Dr. S. E. Dyke.

The board of health was discharged, and a health officer appointed instead, and under the supervision of the health officer, the work of the village has been looked after. There have been no improvements of a sanitary nature during the year, other than looking after privy vaults, hog pens, slaughter houses and other nuisances, all of

I would suggest more rigid laws in regard to the sanitary condition of school houses; also that persons with consumption ought not to teach school.

Cases of infectious diseases reported: Smallpox, 55; diphtheria, 86; scarlet fever, 18; chicken pox, 21; measles, 33; total number of infectious diseases, 213.

STRASBURG, TUSCARAWAS COUNTY.

Population, 800.

Person making report, J. C. Schutzbach, health officer.

Health officer, J. C. Schutzbach.

Clerk, W. S. Spidel.

Cases of infectious diseases reported: Chicken pox, 30; total number of infectious diseases, 30.

STRYKER, WILLIAMS COUNTY.

Population, 1,200.

Person making report: Dr. C. F. Mignin, health officer.

Health officer, C. F. Mignin.

The old health board was discontinued and a health officer appointed instead in July. The time has been too short to judge as to the advisability of that move, and I can only say that it simplifies the work and makes it more satisfactory than it was with a board. There is no pesthouse here.

Cases of infectious diseases reported: Scarlet fever, 4; typhoid fever, 3; total number of infectious diseases, 7.

SUGAR GROVE, FAIRFIELD COUNTY.

Population, estimated, 400.

Person making report, S. Renshaw, health officer.

Health officer, S. Renshaw.

Clerk, S. Renshaw.

The sanitary condition of the village is good. One case typhoid fever and two cases of measles, the only acute infectious diseases reported. We have no hospital or pesthouse. I believe health officer in lieu of health board for villages is best.

Cases of infectious diseases reported: Typhoid fever, 1; measles, 2; total number of infectious diseases, 3.

SUMMERFIELD, NOBLE COUNTY.

Population, 700.

Person making report, John Baughin, health officer.

Health officer, John Baughin.

Clerk, Chas. Hare.

Cases of infectious diseases reported: Diphtheria, 6; scarlet fever, 1; total number of infectious diseases, 7.

SYCAMORE, WYANDOT COUNTY.

Population, 825.

Person making report, W. H. Wickham, health officer.

Health officer, W. H. Wickham.

I believe that our village is in quite good sanitary condition. We have had no epidemic of any kind within the past year. From reports we have been surrounded by fevers, yet we have escaped. So far as I am able to state the new system or code (so far as health is concerned) is working very well.

Cases of infectious diseases reported: None.

SYLVANIA, LUCAS COUNTY.

Population, 850.

Person making report, G. A. Crandall, health officer.

Health officer, G. A. Crandall.

The only improvements that have been made are the opening of drains to carry off surface water and the filling of some low places. No regulations have been made in regard to the milk supply or collection of garbage. No difficulties have been encountered in enforcing the new code. We have no hospital or pesthouse. The plan of having a health officer in lieu of a board of health seems to be perfectly satisfactory.

Cases of infectious diseases reported: None.

TIFFIN, SENECA COUNTY.

Population, 12,000.

Person making report, Dr. A. C. Schwartz, health officer.

Health officer, Dr. A. C. Schwartz.

Clerk, A. R. Canter.

We have made no improvements. No new regulations in regard to milk supply and collection of garbage have been made. We have had no trouble in enforcing new code. We have neither hospital nor pesthouse for small-pox patients.

Cases of infectious diseases reported: Smallpox, 10; diphtheria, 95; membranous croup, 1; scarlet fever, 8; typhoid fever, 31; measles, 10; total number of infectious diseases, 195.

TIPPECANOE CITY, MIAMI COUNTY.

Population, 2,100.

Person making report, F. N. Agenbroad, health officer.

Health officer, F. N. Agenbroad.

Clerk, J. V. Sullivan.

Cases of infectious diseases reported: Smallpox, 31; diphtheria, 1; typhoid fever, 3; total number of infectious diseases, 35.

TOLEDO, LUCAS COUNTY.

Population, 150,000.

Person making report, W. W. Brand, M. D., health officer.

Health officer, W. W. Brand, M. D.

A commission was engaged in making a study of the water supply and presented a most admirable report with recommendations.

One of the most complete smallpox hospitals in the country was constructed.

A milk ordinance is now in force and will be in full operation by April 1st, so that when the heated term is reached we hope to materially reduce the infant mortality rate. A sample was examined from every milk depot, milk train and milk man (1,447 in all), and when a poor quality was found two samples were examined. Frequent inspections were made of creameries and milk depots in regard to the condition of receptacles and their surroundings, and better sanitary conditions were the result. During the year 391 such inspections were made. Six prosecutions were brought, with four convictions and two dismissals.

The meat and milk inspector made the following inspections: 3,245 meat markets, 1,850 produce and fruit houses, 170 fish markets. 574 groceries, 110 markets in Polish and Hungarian districts.

In the sanitary department 46,088 inspections were made: 18,963 verbal notices issued; 5,083 written notices issued; 24,046 nuisances abated; 123 (contagious or infectious) funerals attended; 1,142 houses were fumigated; 7 contagious and infectious beddings destroyed; 310 business houses were notified of clerks residing where a contagious disease existed; 542 schools were notified where contagious diseases existed; 496 schools were notified where contagious diseases recovered. Total expenses of board of health was, \$61,742.51.

During 1903 there were 1,849 deaths—rate per 1,000 12.26%; during 1903 there were 946 births reported.

Cases of infectious diseases reported: Smallpox, 194; diphtheria, 561; membranous croup, 75; scarlet fever, 81; typhoid fever, 59; whooping cough, 4; measles, 150; other infectious diseases, 138; total number of infectious diseases, 1,262.

TORONTO, JEFFERSON COUNTY.

Population, 4,000.

Person making report, A. W. Goodlin, health officer.

Health officer, A. W. Goodlin.

Cases of infectious diseases reported: Smallpox, 2; scarlet fever, 10; typhoid fever, 21; other infectious diseases, 11; total number of infectious diseases, 44.

TRENTON, BUTLER COUNTY.

Population, 450.

Person making report, Wilson Thompson, health officer.

Health officer, Wilson Thompson.

Clerk, Odin Schmidt.

The village has no pesthouse, but is in good sanitary condition.

Cases of infectious diseases reported: None.

UHRICHSVILLE, TUSCARAWAS COUNTY.

Population, 5,000.

Person making report, R. W. Walten, clerk.

Health officer, Dr. James A. McCollam.

Clerk, R. W. Walten.

Cases of infectious diseases reported: Smallpox, 2; diphtheria, 11; scarlet fever, 1; typhoid fever, 3; other infectious diseases, 5; total number of infectious diseases, 22.

UNION CITY, DARKE COUNTY.

Population, 1,284.

Person making report, D. J. Wise, health officer.

Health officer, D. J. Wise.

Clerk, Clinton Earnhart.

Cannot say that any improvement has been made in sanitary conditions. No new regulations have been enforced as regards milk supply or collection of garbage. We have encountered no difficulties in enforcing health code. We have no hospital or pesthouse.

I would suggest as an improvement in the health laws that boards of health be disposed with entirely in villages and sanitary work left with a health officer appointed by council.

Cases of infectious diseases reported: Membranous croup, 1; typhoid fever, 8; whooping cough, 1; total number of infectious diseases, 10.

UNIOPOLIS, AUGLAIZE COUNTY.

Population, 500.

Person making report, Dr. J. W. Hurlburt, health officer.

Health officer, Dr. J. W. Hurlburt.

Sanitary improvements have been the abatement of twelve nuisances. The regulations regarding milk or garbage, contained in rules recommended by the state board to health officer appointed in lieu of board of health were adopted. I have encountered much difficulty in the past year because our board of health went out of existence as a board and the people in many instances refused to acknowledge that I had any authority and in addition to this trouble they did not seem to understand that a board of health or health officer was a creation of the law for their good. But these conditions are improving under the new regime and I think in a short time if matters are permitted to remain as at present all will be satisfactory.

We have no pesthouse.

As a health officer appointed in lieu of a board of health, I will say that my experience with the new code so far has been very satisfactory.

Cases of infectious diseases reported: Membranous croup, 1; scarlet fever, 25; typhoid fever, 1; measles, 35; total number of infectious diseases, 62.

URBANA, CHAMPAIGN COUNTY.

Population, 7,800.

Person making report, Dr. H. M. Pearce, health officer.

Health officer, H. M. Pearce.

Clerk, H. M. Pearce.

The sanitary condition of the city is better. No new regulations have been enforced in regard to milk or garbage. No difficulties have been encountered with new code. We have no hospital or pesthouse.

Cases of infectious diseases reported: Smallpox, 48; scarlet fever, 4; typhoid fever, 11; measles, 8; other infectious diseases, 11; total number of infectious diseases, 82.

UTICA, LICKING COUNTY.

Population, 1,000.

Person making report, G. T. Ely, health officer

Health officer, G. T. Ely, M. D.

We have had some trouble in regard to the disposal of garbage and in enforcing the rules and regulations relative to privies and cess pools, but the village has been remarkably free from contagious diseases during the past year. There have been no new regulations as regards milk supply and garbage disposal. The new plan has been perfectly satisfactory this year.

Cases of infectious diseases reported: Diphtheria, 2; typhoid fever, 3; whooping cough, a few cases but not reported; mumps, plenty of cases,

not reported; total number of infectious diseases, 5.

VAN BUREN, HANCOCK COUNTY.

Population, 380.

Person making report, James P. Grubb, mayor.

Health officer, J. P. Grubb.

Clerk, Frank Hissong.

No improvements were made in sanitary condition of village. No new regulations made in reference to milk or garbage. We have no hospital or pesthouse. I think the new plan the better.

Cases of infectious diseases reported: Smallpox, 3; typhoid fever, 1; whooping cough, 12; measles, 2; total number of infectious diseases, 18.

VANDALIA, MONTGOMERY COUNTY.

Population, 350.

Person making report, Dr. W. H. Riley, health officer.

Health officer, Dr. W. H. Riley.

The new plan of health officer in lieu of a board of health seems to work satisfactorily and I believe will be able to handle all matters. Have encountered no difficulties with the new code. Have no hospital or pesthouse. The sanitary condition of the village is first-class as manifested in death report of only one and that a person 93 years of age.

Cases of infectious diseases reported: None.

VAN WERT, VAN WERT COUNTY.

Population, estimated, 8,000.

Person making report, C. G. Church, M. D., health officer.

Health officer, C. G. Church, M. D.

Clerk, C. F. Manship.

Our board has not adopted anything new in the past year. We have enforced a systematic cleaning of vaults. We have found no trouble thus far in enforcing the new health code. We have no pesthouse. During the year we have purchased a new dump and garbage ground of eleven acres.

Cases of infectious diseases reported: Smallpox, 2; scarlet fever, 9; measles, 6; total number of infectious diseases, 17.

VERMILION, ERIE COUNTY.

Population, 1,184.

Person making report, J. M. Delker health officer.

Health officer, J. M. Delker.

Clerk, C. H. Nuhn.

Cases of infectious diseases reported: Smallpox, 20; typhoid fever, 1; total number of infectious diseases, 21.

VERSAILLES, DARKE COUNTY.

Population, 1,500.

Person making report, C. F. Ryan, health officer.

Health officer, C. F. Ryan.

Clerk, C. F. Ryan.

Not much has been done in the way of sanitary improvements. One street that was unsanitary was put in good condition. No new regulations regarding the milk supply and collection of garbage were made. We have difficulty in getting privy vaults cleaned promptly after having been notified. If the board will sustain me hereafter when people do not comply with the notice, I shall have it done at the expense of the property, in the way of tax. We have no pesthouse for smallpox.

Cases of infectious diseases reported: Scarlet fever, 4; tetanus (died), 1; total number of infectious diseases, 5.

VIENNA CROSS ROADS, CLARK COUNTY.

Population, 335.

Person making report, E. A. Dye, M. D., health officer.

Health officer, E. A. Dye, M. D.

Clerk, Roy Cartie.

Our rapidly growing little village is keeping pace with towns of its size and by so doing, it is having less sickness. We have no pesthouse, but county is supplied with the pesthouse of Springfield, 12 miles west.

Cases of infectious diseases reported: Whooping cough, 20; total number of infectious diseases, 20.

WADSWORTH, MEDINA COUNTY.

Population, 2,350.

Person making report, M. C. Lytle, assistant health officer and secretary.

Health officer, C. N. Lyman, M. D.

Clerk, M. C. Lytle.

There have been few improvements this year as it has been a waiting year to know whether the council will establish a system of sewerage. We have no regulations as to the milk supply. Our milk men get their milk supply daily from October to June, from the farmers, and from June to October twice a day. We have never had any ill effects from the milk and have made no regulations for it. We have never had any regulations in reference to garbage, the village scavenger having taken care of it and charging each person for his services. We have no hospital or pesthouse.

Cases of infectious diseases reported: Diphtheria, 1; scarlet fever, estimated, 20; typhoid fever, estimated, 20; measles, estimated, 40; total number of infectious diseases, estimated; 81.

**WAPAKONETA, AUGLAIZE
COUNTY.**

Population, 5,000.

Person making report, A. Kohler,
health officer.

Health officer, A. Kohler.

Clerk, A. Kohler.

We have no hospital or pesthouse.
We have a garbage lot outside of cor-
poration.

Cases of infectious diseases re-
ported: Scarlet fever, 10; typhoid fe-
ver, 4; measles, 4; total number of in-
fectious diseases, 18.

A health officer was appointed in
lieu of a board of health, and we think
the plan altogether satisfactory, espe-
cially in a village of the size of ours,
where it is almost impossible to keep
up a full board. The sanitary condi-
tion of the village is as good as it is
possible to have it. We have no hos-
pital or pesthouse. The death rate
of the village was very low for the
year ending December 31, 1903. There
were no cases of infectious diseases
reported during the year.

WARREN, TRUMBULL COUNTY.

Population, estimated, 12,000.

Person making report, D. E. Hoover,
health officer.

Health officer, D. E. Hoover.

Clerk, A. L. Jameson.

During the year there have been five
persons arrested and fined for viola-
tions: One each for selling milk and
meat without certificates of inspec-
tion—costs in each case; one for vio-
lation of spit ordinance—one dollar
and costs; one for polluting Mahoning
river—one dollar and costs; one for
selling skimmed milk—fifty dollars
and costs. A pesthouse has been pur-
chased; will be remodeled and equip-
ped and ready for occupancy in two
months.

Cases of infectious diseases re-
ported: Smallpox, 8; diphtheria, 10;
scarlet fever, 12; typhoid fever, 28;
measles, 5; chicken pox, 34; total
number of infectious diseases, 97.

**WASHINGTON C. H., FAYETTE
COUNTY.**

Population, 6,000.

Person making report, F. M. Bate-
man, health officer.

Health officer, F. M. Bateman.

Clerk, F. M. Bateman.

The sanitary condition of our city
is as good as could be expected with
the very poor sewerage system we have
here, but we are in hopes that we will
in a few years at least have that sys-
tem in better shape. We have had
only three cases of typhoid fever in
the last year which is the least for a
number of years. During the past
year the board has had to deal with
forty-eight cases of smallpox, and ex-
pended during our smallpox epidemic
the sum of \$3,000. We have rented a
house here which we use for a pest-
house just outside the city limits and
in a very good location for such use.
We feel that the sanitary condition of
our city is in a better condition at the
beginning of this year than it has been
for many years. Our city water as
tested by the state board of health is
good and it is very generally used by
our citizens.

Cases of infectious diseases re-
ported: Smallpox, 48; diphtheria, 1;
scarlet fever, 1; typhoid fever, 2;
measles, 1; total number of infectious
diseases, 53.

**WASHINGTON, GUERNSEY
COUNTY.**

Population, 400.

Person making report, S. B. Law-
rence, health officer.

Health officer, S. B. Lawrence.

WAVERLY, PIKE COUNTY.

Population, 1,800.

Person making report, James J. Emmitt, health officer.

Health officer, James J. Emmitt.
Clerk, J. W. Dingleline.

There has been a scarcity of infectious diseases, the four cases of measles were imported recently from Columbus.

Cases of infectious diseases reported: Scarlet fever, 4; measles, 4; total number of infectious diseases, 8.

WAYNESBURG, STARK COUNTY.

Population, 700.

Person making report, Dr. Gustav A. Shane, health officer.

Health officer, Gustav A. Shane.
Clerk, H. Sweet.

Cases of infectious diseases reported: Diphtheria, 1; total number of infectious diseases, 1.

WAYNESFIELD, AUGLAIZE COUNTY.

Population, 550.

Person making report, F. M. Berry, health officer.

Health officer, F. M. Berry.
Clerk, Dr. W. S. Turner.

We have had an exceptionally good year. Have been remarkably free from contagious diseases, and have had but a very small death rate. We attribute our success largely to the thorough cleaning up of the entire village each year, more especially to the rigid cleaning and disinfecting of privies during the summer months.

The board of health has had regular meetings, but has had little to do. The present plan as adopted has proven very satisfactory to us.

Cases of infectious diseases reported: Typhoid fever, 1; total number of infectious diseases, 1.

WAYNESVILLE, WARREN COUNTY.

Population, 750.

Person making report, C. W. Henderson, health officer.

Health officer, C. W. Henderson.
Clerk, John H. Caskey.

There has been no work of any importance done by the health board of this village during the year. Our village is favorably located as to natural drainage and we have had as yet no trouble along this line. Garbage is collected twice each week during the greater part of the year and removed from the village to a point that makes contamination, etc., impossible. We have no hospital or pesthouse. No difficulties have been encountered in enforcing the new health code. One trouble that I anticipate will arise within the year, is from the draining of water closets situated in houses supplied with water from the city water works. We have no sewerage system, and vaults have been constructed on the premises in such a manner that the fluids from the closets after filtering through gravel and sand are allowed to flow through drains into the open gutters. The solid matter is left behind and removed at regular intervals. This arrangement was sanctioned by the old board and has been allowed to continue; but I feel certain that it is only a question of time when it will be a source of trouble, not only a nuisance but a menace to the health of the village. Another matter that should be attended to is the appointment of a health officer for this (Wayne) township in accordance with section 2117 of the state laws. Lack of such an officer makes it difficult for the local or village health officer to prevent the introduction into the village of contagious diseases prevailing in the township outside the limits of the corporation.

Cases of infectious diseases reported: Whooping cough, 4; total number of infectious diseases, 4.

WELLINGTON, LORAIN COUNTY.

Population, 2,064.

Person making report, R. G. Holland, health officer.

Health officer, R. G. Holland.

Clerk, H. W. Hall.

There have been no deaths from infectious diseases during the year and very few cases of zymotic diseases and no deaths from this cause. As regards improvements there has been nothing done. There was no meeting of the board during the year 1902, although a great many nuisances were abated by the health officer, the most common complaint being, perhaps, that of the disposal of garbage. There have been no steps taken in regard to the milk supply. This would seem like a very important measure. I found a very bad case of tuberculosis in a cow which was promptly disposed of. Several families were taking the milk. As regards the new code there is at the present time a question as to who is the legal health officer of the village. We have maintained our position, not so much for the office as for principle. There have been extensive changes made in our water supply system. This has been done without permission from the state board as the law provides, so far as we are able to ascertain. We have no hospital or pesthouse. The uncertainty as to who are the legal board of health we trust will be sufficient excuse for not making a more commendable advancement in sanitary measures and enforcement of the laws of the state for the collection of the vital statistics and the protection of our people.

Cases of infectious diseases reported: None.

WELLSTON, JACKSON COUNTY.

Population, 10,000.

Person making report, W. J. Brown, health officer.

Health officer, W. J. Brown.

Cases of infectious diseases re-

ported: Smallpox, 18; scarlet fever, 1; measles, 53; total number of infectious diseases, 72.

WELLSVILLE, COLUMBIANA COUNTY.

Population, 7,000.

Person making report, M. C. Tarr, health officer.

Health officer, M. C. Tarr.

Clerk, E. C. Taylor.

Cases of infectious diseases reported: Smallpox, 2; diphtheria, 5; membranous croup, 1; scarlet fever, 10; typhoid fever, 22; measles, 8; total number of infectious diseases, 48.

WEST CARROLLTON, MONTGOMERY COUNTY.

Population, 1,000.

Person making report, Frank Hinkson, health officer.

Health officer, Frank Hinkson.

Clerk, J. B. McNabb.

We have found no difficulties in enforcing new health code. We have no hospital or pesthouse. The plan of appointing a health officer in lieu of a board of health has been satisfactory.

Cases of infectious diseases reported: Scarlet fever, 4; whooping cough, 1; other infectious diseases, 8; total number of infectious diseases, 13.

WESTERN STAR, SUMMIT COUNTY.

Population, 248.

Person making report, Fred Becker, health officer.

Health officer, Fred. Becker.

No improvements were made in the sanitary condition of the village. No new regulations have been made in regard to milk or garbage. The village has no pesthouse or hospital.

Cases of infectious diseases reported: Measles, 6; total number of infectious diseases, 6.

WESTERVILE, FRANKLIN COUNTY.

Population, 1,500.

Person making report, Peter A. Conklin, health officer.

Health officer, Peter A. Conklin.

Clerk, C. T. Sprague.

Cases of infectious diseases reported: Smallpox, 1; measles, 4; total number of infectious diseases, 5.

WEST JEFFERSON, MADISON COUNTY.

Population, 830.

Person making report, W. H. Pence, secretary board of health.

Health officer, Martin Carroll.

Clerk, W. H. Pence.

Cases of infectious diseases reported: Diphtheria, 2; total number of infectious diseases, 2.

WEST LIBERTY, LOGAN COUNTY.

Person making report, Edward R. Henning, M. D., health officer.

Health officer, Edward R. Henning.

Clerk, Edward R. Henning.

Have encountered no difficulties in enforcing the new code. We have no hospital or pesthouse. The plan is satisfactory of having a health officer in lieu of board of health.

Cases of infectious diseases reported: Smallpox, 3; diphtheria, 5; scarlet fever, 2; typhoid fever, 4; total number of infectious diseases, 14.

WEST MANSFIELD, LOGAN COUNTY.

Population, 1,000.

Person making report, H. A. Skidmore, M. D., health officer.

Health officer, H. A. Skidmore, M. D.

Clerk, C. D. Atkinson.

Cases of infectious diseases reported: Typhoid fever, 3; other infectious diseases, 4; total number of infectious diseases, 7.

WEST MILTON, MIAMI COUNTY.

Population, 1,200.

Person making report, Gainor Jennings, health officer.

Health officer, Gainor Jennings.

Clerk, Charles E. Fox.

The board has had, and still has, under advisement the best disposition of the four (4) ponds situated within the village. Especial complaint has been made by those living near the Rutledge and Everett ponds. The action of the board of health should, under sections 2149 to 2152, be limited to instructing the council as to the best disposition of the ponds, calling attention to section 6922, Municipal Code Act (O. L., v. 29, p. 114). During the year an excellent system of waterworks has been installed in the village. A proper sewerage system, in connection with the waterworks, would make the sanitary condition of the village nearly perfect. There are no regulations regarding the milk supply and the collection of garbage. The milk supply seems to be satisfactory in every way. Some one should be employed to collect and haul out of the village at least twice a month (better once a week), the garbage. At present night-soil and garbage are deposited, at the property owners' expense, on Geo. Niles' field across the river, northeast of the village. We have no hospital or pesthouse to which smallpox patients may be removed. Land should be purchased and a small pesthouse built thereon, as provided in sec. 2130 (O. L., v. 95, p. 430). Likely arrangements could be made with the Union township board to assume half the expense, if allowed the use of the

building. Ice has been harvested from the river below the Milton dumping ground. There may be some question regarding the purity of this ice. The law, sections 2, 3 and 4 (O. L., v. 95, p. 330), allows health boards to regulate the cutting and sale of ice. The Milton board should adopt suitable resolutions regulating the cutting and sale of ice within the village. Contagious and infectious diseases are properly reported and proper restrictive measures are enforced. No deaths from infectious diseases. No prosecutions brought by the board for violations of its orders or laws. Sec. 2116 says "The clerk of the board shall keep a full and accurate record of all births, deaths and cases of contagious diseases reported to the health officer." Without instructions from the board, the health officer is keeping this record. Sec. 2137 requires the board of health to inspect semiannually the sanitary condition of our schools and school buildings. That part of sec. 2141 which says: "No person in charge of any cemetery shall receive a corpse for burial unless accompanied with the permit of the board of health" is not observed. The present sanitary condition of our village is good. Our streets, alleys and yards are in a cleanly conditions. \$127.40 was spent by the board during the year ending December 31, 1903.

Cases of infectious diseases reported: Typhoid fever, 5; total number of infectious diseases, 5.

WHARTON, WYANDOT COUNTY.

Population, 600.

Person making report, Moses Kean, clerk.

Health officer, J. J. Mayer.

Clerk, Moses Kean.

Cases of infectious diseases reported: Whooping cough, 25; measles, 10; total number of infectious diseases, 35.

WHITEHOUSE, LUCAS COUNTY.

Population, 620.

Person making report, John F. Lehman, health officer.

Health officer, John F. Lehman.

Clerk, John F. Lehman.

Cases of infectious diseases reported: Scarlet fever, 1; total number of infectious diseases, 1.

WILLIAMSPORT, PICKAWAY COUNTY.

Population, 600.

Person making report, Thomas Ferguson, health officer.

Health officer, Thomas Ferguson.

Clerk, Tom. H. Tipton.

No improvements, save usual spring cleanup. No new regulations of any kind were made. No difficulties were encountered with new code. We have no pesthouse. There have been a number of cases of whooping cough and mumps, none serious, and no deaths. Doctors do not report these to board, and number has been estimated. One case of measles reported December 29. Case is quarantined from those who have never had the disease. This case probably contracted in Chillicothe, Ross county, Ohio.

Cases of infectious diseases reported: Whooping cough, estimated, 15; measles, 1; other infectious diseases, mumps, estimated, 20; total number of infectious diseases, estimated, 36.

WILSHIRE, VAN WERT COUNTY.

Population, 750.

Person making report, C. W. Bobo, M. D., health officer.

Health officer, C. W. Bobo, M. D.

Cases of infectious diseases reported: Smallpox, 6; scarlet fever, 3; typhoid fever, 8; measles, 90; total number of infectious diseases, 107.

WILLOUGHBY, LAKE COUNTY.

Person making report, C. C. Jenkins, clerk.

Health officer, James Maloney.

Clerk, C. C. Jenkins.

Cases of infectious diseases reported: Diphtheria, 3; scarlet fever, 2; total number of infectious diseases, 5.

WREN, VAN WERT COUNTY.

Population, 350.

Person making report, Dr. P. G. Havice, health officer.

Health officer, P. G. Havice, M. D.

Cases of infectious diseases reported: Diphtheria, 6; measles, 16; total number of infectious diseases, 22.

WILMINGTON, CLINTON COUNTY.

Population, 4,000.

Person making report, A. T. Quinn, M. D., health officer.

Health officer, A. T. Quinn, M. D.

Clerk, A. T. Quinn, M. D.

The sanitary condition of the village is good and no improvements are necessary. The milk supply and collection of garbage has been given special attention. We have no difficulty in enforcing the new code. We have no hospital or pesthouse.

Cases of infectious diseases reported: Typhoid fever, 9; total number of infectious diseases, 9.

WINCHESTER, ADAMS COUNTY.

Population, 800.

Person making report, C. S. Corboy, health officer.

Health officer, C. S. Corboy.

Clerk, J. T. McClure.

Cases of infectious diseases reported: Scarlet fever, 2; typhoid fever, 4; total number of infectious diseases, 6.

WOODVILLE, SANDUSKY COUNTY.

Population, 1,800.

Person making report, Dr. R. M. Durbin, health officer.

Health officer, Dr. R. M. Durbin.

Clerk, Jno. S. Meyer.

Cases of infectious diseases reported: Diphtheria, 2; typhoid fever, 2; total number of infectious diseases, 4.

WYOMING, HAMILTON COUNTY.

Population, 1,500.

Person making report, Geo. Stoddard, health officer.

Health officer, Geo. Stoddard.

Clerk, Geo. Stoddard.

Wyoming has the lowest death rate this year it has ever had of which we have any official record; and is noted as having the finest streets in Hamilton county, and our sanitary police are very particular, regarding keeping the alleys clean, removal of garbage, etc. So zymotic diseases have been very light the past year. Have had two cases of smallpox in its mild form (the same as it was four years ago). These cases were properly quarantined, watched over, fed and finally discharged after a proper fumigation and disinfection, entailing an expense to the village of only \$45.32. They were both directly traceable to the neighboring village of Greenwood, West Lockland. I recommended to the board compulsory vaccination if need be, and was given full power to act. So I had everybody in the 2d Health District, which adjoins Greenwood, who was not vaccinated four years ago (when we had compulsory vaccination) or who could not show up good scars, vaccinated, during the past month—all but one, who holds out, and have given him the choice of going back to Kentucky where he came from, or be vaccinated—so I feel that we have safe-guarded it all we can. We have no pesthouse, except the regular county pesthouse and I have preferred to handle all our cases at home, and you will remember that four years ago I had a lot of them.

Cases of infectious diseases reported: Smallpox, 2; total number of infectious diseases, 2.

YELLOW SPRINGS, GREENE COUNTY.

Population, about 1,500.

Person making report, J. P. Miller, clerk.

Health officer, Isaac Loe.

Clerk, J. P. Miller.

Our board of health has taken more vigorous action during the past year in abating nuisances than ever before. Especially have we looked after the source of contamination of our drinking water. Water from suspected public and private wells has been examined by your state chemist, and your recommendations, based upon his findings, have been carried out as far as possible. We think we are creating a public sentiment in favor of proper sanitation that will slowly bear fruit, though we meet with much opposition.

Cases of infectious diseases reported: Scarlet fever, 16; typhoid fever, 15; whooping cough, 4; measles, 13; total number of infectious diseases, 48.

YORKSHIRE, DARKE COUNTY.

Population, 200.

Person making report, George W. Hamilton, health officer.

Health officer, Geo. W. Hamilton.

We have no hospital or pesthouse. Our mode of fighting diseases is cleanliness and isolation.

Cases of infectious diseases reported: Smallpox, 1; typhoid fever, 2; measles, 2; total number of infectious diseases, 5.

YOUNGSTOWN, MAHONING COUNTY.

Population, estimated, 55,000.

Person making report, H. E. Welch, M. D., health officer.

Health officer, H. E. Welch, M. D.

Secretary, Clate A. Smith.

Cases of infectious diseases reported: Smallpox, 130; diphtheria, 47;

scarlet fever, 36; typhoid fever, 437; whooping cough, 37; measles, 79; total number of infectious diseases, 766.

ZANESVILLE, MUSKINGUM COUNTY.

Population, 28,000.

Person making report, C. P. Sellers, health officer.

Health officer, C. P. Sellers.

The sanitary condition of the city has been improved by the construction of the following sanitary sewers, viz.: South street, Pierce street and Fountain alley, Marble alley and Spring alley; total, about 3,044 feet. No new regulations have been enforced in regards to milk supply. Garbage was handled the same as in the past. We have no hospital or pesthouse for the removal of smallpox patients. They have been quarantined where found. This alone has given the board of health more trouble than all other things. The board of public service have now (January 18, 1904) purchased a building to be used for a pesthouse and will fit it up as soon as possible.

Cases of infectious diseases reported: Smallpox, 72; diphtheria, 28; scarlet fever, 8; total number of infectious diseases, 108.

ZOAR, TUSCARAWAS COUNTY.

Population, 250.

Person making report, Charles Breymer, health officer.

Health officer, Charles Breymer.

No improvements in the sanitary condition of the village were made last year. Our milk supply is good. Collection of garbage, etc., good. I have not encountered difficulties in enforcing the new health code. We have no hospital or pesthouse. Have not heard of any complaints against new health code.

Cases of infectious diseases reported: Whooping cough, 13; total number of infectious diseases, 13.

ANNUAL REPORT OF TOWNSHIP BOARDS OF HEALTH.

There are 1,352 township boards of health in the state: That is, the law provides that the three trustees of the township shall constitute a board of health for the township, such board to have all the powers and duties of boards of health of cities and villages. In a considerable number of townships the trustees have taken no action as a board of health.

The following list of questions was sent to the clerk of each township board of health:

1. Has your board of health appointed a health officer, as required by Section 2,117? If so, give his name and address.
2. How many meetings has the board held during the year
3. Give number and character of nuisances abated by the board.
4. How many cases of contagious disease were quarantined by your board?
5. Have attending physicians failed to report contagious diseases?
6. Has the board brought any prosecutions during the year?
7. If so, for what cause and with what result?
8. Give estimated number of persons in the township who were vaccinated during the year.
9. What amount of money was spent for board of health purposes?
10. What suggestions have you to offer for increasing the efficiency of township boards of health?
11. Give name of officer or member of the board who can be communicated with by telephone.

Reports were received from 1,077, or 79.7 per cent. of the entire number, a little better than for last year.

Only a summary of these reports can be published, but this will fairly indicate the amount of sanitary work being done in the rural districts.

TOWNSHIP HEALTH OFFICERS.

Five hundred and twenty-six, of the 1,077 boards reporting, have appointed a health officer.

MEETINGS OF THE BOARDS.

Seven hundred and forty of the boards reporting held meetings during the year.

NUISANCES ABATED.

Three hundred and thirteen nuisances were reported abated by 133 different boards of health.

CONTAGIOUS DISEASES REPORTED.

The contagious or infectious diseases reported were as follows: Smallpox, 1,695 cases in 236 townships; diphtheria, 570 cases in 170 townships; scarlet fever, 1,186 cases in 274 townships; typhoid fever, 871 cases in 197 townships; whooping cough, 858 cases in 68 townships, and measles, 1,513 cases in 132 townships.

PHYSICIAN'S REPORT OF CONTAGIOUS DISEASES.

In 178 townships physicians failed to report cases of contagious diseases.

PROSECUTIONS.

Eleven boards brought prosecutions during the year.

VACCINATIONS.

Thirty-four thousand, eight hundred and four persons (estimated) were vaccinated in 385 townships.

MONEY SPENT FOR BOARD OF HEALTH PURPOSES.

Only 548 township boards of health reported an expenditure of money for sanitary purposes. The amount spent was \$81,500.50, an average of about \$148.74 for each township. The largest amount spent in any one township was \$3,000. Most of this sum was spent in combating smallpox. The least amount spent was one dollar.

On the whole it must be admitted that sanitary matters in rural districts are not receiving such attention as they deserve.



ABSTRACT OF REPORTS

OF

DEATHS AND THEIR CAUSES

DURING 1903

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ABSTRACT OF THE REPORTS OF DEATHS AND THEIR CAUSES DURING APRIL, 1903.

Cities over 5,000 Population. Census 1900.	Population.	Total deaths.	Annual rate per 1,000.	Total under one year.	Total under five years and over one year.	Total Zymotic Diseases.	Croup and Diphtheria.	Cholera Infantum.	Cerebro-Spinal Meningitis.	Cholera Morbus.	Diarrhœal Diseases.	Dysentery.	Malarial Fever.	Measles.	Puerperal Fever.	Scarlet Fever.	Tonsillitis.	Typhoid Fever.	Whooping Cough.	Total Constitutional Diseases.	Cancer.	Thibisits Pulmonalis.	Total Local Diseases.	Apoplexy.	Bright's Disease.	Bronchitis.	Convulsions.	Gastritis and Peritonitis.	Heart Disease.	Meningitis.	Pleurisy.	Pneumonia.	Total Developmental Dis- eases.	Total Violence.	Premature and Still Births.
Akron	42,728	55	15.44	6	1	6															15	8	1	26	1	3		4	1	6	1			8	
Alliance	8,974	12	16.04																		6	1		8										1	
Ashtabula	12,919	36	21.00	5																	6	5		15		1		1	1	4	1			3	
Bellaire	3,912	13	33.75																		1	1		2										1	
Bellevue	6,049	5	16.57																		1	1		2										1	
Bowling Green	5,067	4	16.57																		1	1		2										1	
Bucyrus	6,560	4	17.31																		1	1		2										1	
Cambridge	8,241	10	11.56																		2	1		3										1	
Canal Dover	5,522	8	10.66																		1	1		2										1	
Canton	30,667	12	10.66	6																	1	1		2										1	
Chillicothe	12,976	23	11.11																		1	1		2										1	
Cincinnati	325,902	526	19.32	73	31	71															102	5		11		3		3	4	1	1	4	1	3	
Cincinnati	6,991	3	3.43																		1	1		2										1	
Cleveland	381,768	668	20.96	146	54	138															96	16		312		11	26	6	40	9	1	78	71	48	42
Columbus	125,660	7	12.98																		1	1		2										1	
Coshocton	6,473	8	11.81																		1	1		2										1	
Coshocton	85,333	84	11.81	7	8	5															27	16		44		3		4	14	4	1	10	5	3	12
Dayton	7,679	9	13.00																		1	1		2										4	
Defiance	7,940	16	20.38	7	4	4															1	1		2										1	
East Liverpool	16,485	8	8.24																		1	1		2										1	
Elyria	8,791	6	8.24																		1	1		2										1	
Findlay	17,613	21	14.31	4	1	1															4	3		12		1		3	1	1				1	
Fostoria	7,730	7	10.87																		1	1		2										1	
Fremont	8,439	8	11.37																		1	1		2										1	
Gallipolis	1,282	6	9.89																		1	1		2										1	
Gallipolis	5,432	13	28.72																		2	2		4										1	
Greenville	5,688	5	10.01																		1	1		2										1	
Hamilton	23,914	31	15.56	3		1															4	1		23		3	1	1	1	1					3

Cities over 5,000
Population.
Census 1900.

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ABSTRACT OF THE REPORTS OF DEATHS AND THEIR CAUSES DURING MAY, 1903.

Cities over 5,000 Population. Census 1900.	Population.	Total deaths.	Annual rate per 1,000.	Total under one year.	Total under five years and over one year.	Total Zymotic Diseases.	Group and Diphtheria.	Cholera Infantum.	Cerebro-Spinal Meningitis.	Cholera Morbus.	Diarrheal Diseases.	Typhenter.	Malarial Fever.	Measles.	Typhoid Fever.	Tonsillitis.	Typhoid Fever.	Whooping Cough.	Total Constitutional Diseases.	Cancer.	Phthisis Pulmonalis.	Total Local Diseases.	Apoplexy.	Bright's Disease.	Bronchitis.	Convulsions.	Gastritis and Peritonitis.	Heart Disease.	Meningitis.	Pleurisy.	Pneumonia.	Total Developmental Dis- eases.	Total Violence.	Premature and Still Births.
Akron	42,728	4913.76	8	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
Alliance	8,974	1520.06	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
Ashabula	12,948	1715.73	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
Bellaire	9,921	1416.95	4	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	
Bellefontaine	6,649	818.94	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
Bowling Green	5,067	811.62	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
Bucyrus	6,500	811.62	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
Cambridge	8,241	1014.56	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
Canal Dover	5,422	3312.36	5	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
Canton	30,067	3312.36	5	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
Chillicothe	12,976	1816.64	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
Cincinnati	325,992	4711.42	63	30	53	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	
Circleville	6,391	812.73	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
Cleveland	381,768	55017.28	135	35	109	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	
Columbus	125,500	7133	3	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
Conneaut	7,133	3	5.04	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
Coshocton	6,473	5	9.26	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
Dayton	85,333	10915.32	13	9	10	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
Delaware	7,579	4	6.04	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
East Liverpool	7,940	4	6.04	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
Ellettsville	16,483	2518.07	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
Findlay	8,791	4	5.46	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
Fostoria	17,613	2214.98	5	4	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
Fremont	7,730	812.42	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
Gallatin	8,439	5	7.11	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
Gallion	7,282	4	6.53	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
Gallipolis	5,432	4	8.81	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
Glenville	5,583	4	8.81	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
Greenville	5,501	3	5.04	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
Hamilton	23,914	2710.54	3	1	3	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
Hamilton	11,868	1818.26	2	4	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	

Cities over 5,000
Population.
Census 1900.

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ABSTRACT OF THE REPORTS OF DEATHS AND THEIR CAUSES DURING DECEMBER, 1903.

Cities over 5,000 Population Census 1900.	Population.	Total deaths.	Annual rate per 1,000.	Total under one year.	Total under five years and over one year.	Total Zymotic Diseases.	Croup and Diphtheria.	Cholera Infantum.	Cerebro-Spinal Meningitis.	Cholera Morbus.	Diarrheal Diseases.	Dysentery.	Malarial Fever.	Measles.	Puerperal Fever.	Scarlet Fever.	Tonsillitis.	Typhoid Fever.	Whooping Cough.	Total Constitutional Diseases.	Phthisis Pulmonalis.	Total Local Diseases.	Apoplexy.	Bright's Disease.	Bronchitis.	Convulsions.	Gastritis and Peritonitis.	Heart Disease.	Meningitis.	Pleurisy.	Pneumonia.	Total Developmental Dis- eases.	Total Violence.	Premature and Still Births.
Akron	42,728	49	13.76	8	1	1	1	1	1	1	1	1	1	1	1	1	1	1	3	1	1	5	36	3	1	1	1	1	1	1	1	1	6	7
Alliance	8,974	7	9.35	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
Ashtabula	12,949	18	16.68	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
Bellaire	9,912	16	19.36	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
Bellevue	6,649	7	16.56	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
Bellevue Green	5,067	7	12.80	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
Bucyrus	6,560	8	11.65	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
Cambridge	8,241	8	11.65	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
Canal Dover	5,422	5	12.13	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
Canton	39,667	32	12.13	6	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
Chillicothe	12,976	7	6.47	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
Cincinnati	325,592	63	24.41	98	62	83	6	6	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
Circleville	6,991	8	13.73	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
Cleveland	281,768	53	17.41	120	31	88	16	3	3	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
Columbus	125,569	7	10.69	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
Columbus	7,133	6	10.69	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
Coshocton	6,473	5	9.37	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
Coshocton	85,333	11	16.03	15	9	9	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
Dayton	7,579	7	16.03	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
Delaware	7,949	9	13.60	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
Delaware	16,485	22	16.01	3	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
East Liverpool	8,791	8	8.19	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
Elvira	17,613	23	15.67	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
Findlay	7,730	6	9.31	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
Forestburg	8,439	3	4.26	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
Fremont	7,282	6	9.80	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
Gallipolis	5,432	1	1.85	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
Gallipolis	5,588	1	1.85	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
Greenville	5,501	2	14.55	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
Hamilton	23,914	2	14.55	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
Ironton	11,863	9	9.10	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	

Cities over 5,000
Population.
Census 1900.

ABSTRACT OF THE REPORTS OF DEATHS

Cities over 5,000 Population. Census 1900.	Population.	Total deaths.	Annual rate per 1,000.	Total under one year.	Total under five years and over one year.	Total Zymotic Diseases.	Croup and Diphtheria.	Cholera Infantum.	Cerebro-Spinal Meningitis.	Cholera Morbus.	Diarrheal Diseases.	Dysentery.	Malarial Fever.	Measles
Akron	42,728	524	12.26	101	19	63	12	21	1	1	1	1	4	...
Alliance	8,974	138	15.38	24	3	15	1	4	...	...	3	4	12	...
Ashtabula	12,949	207	15.99	44	18	44	14	12	...	...	...	...	...	...
Bellaire	9,912	155	15.61	30	29	157	3	3	...	...	4	...	...	...
Bellefontaine	6,649	...	...	...	...	...	...	...	...	...	...	...	...	...
Bowling Green	5,067	64	12.63	4	...	157	2	4	1	...	...	1	...	12
Bucyrus	6,560	60	9.15	5	3	9	...	...	...	1	...	...	...	...
Cambridge	8,241	124	15.05	14	5	133	...	...	...	...	3	...	...	12
Canal Dover	5,422	58	10.70	5	...	121	3	5	...	...	3	...	...	...
Canton	30,667	344	11.22	62	28	176	...	...	...	...	1	...	...	...
Chillicothe	12,976	202	15.57	...	...	120	1	3	...	1	...	...	...	12
Cincinnati	325,902	6,201	19.03	919	427	875	63	...	20	...	386	24	19	1
Circleville	6,991	102	14.59	12	...	6	...	...	...	1	...	...	...	11
Cleveland	381,768	6,799	17.81	1,735	550	1,466	204	54	26	453	19	8	10	...
Columbus	125,560	1,787	14.23	261	114	293	5	...	...	27	...	...	...	...
Conneaut	7,133	51	7.15	13	...	5	1	...	...	...	...	...	...	...
Coshocton	6,473	75	11.59	11	6	16	...	...	...	1	...	...	...	...
Dayton	85,333	1,198	14.04	180	68	134	6	25	11	25	7	1	...	...
Defiance	7,579	...	...	...	...	...	...	...	...	...	...	...	...	...
Delaware	7,940	78	9.82	...	...	13	...	...	...	...	...	...	...	...
East Liverpool	16,485	337	20.44	28	30	40	12	10	...	...	1	1	1	...
Elyria	8,791	120	13.65	12	7	12	12	...	...	...	...	...	...	2
Findlay	17,613	212	12.04	33	12	18	...	...	...	...	...	...	...	...
Postoria	7,730	105	13.58	...	...	9	...	...	...	...	...	...	...	...
Fremont	8,439	86	10.19	8	3	11	...	...	...	...	...	...	...	...
Galion	7,282	84	11.54	10	6	15	...	1	1	...	...	...	1	5
Gallipolis	5,432	65	11.97	...	...	16	1	2	6	...	1	1	...	...
Glenview	5,588	86	15.39	10	13	19	...	...	...	...	1	...	...	...
Greenville	5,501	...	...	...	...	...	...	...	...	...	...	...	...	...
Hamilton	23,914	326	13.63	41	9	61	10	3	8	10	4	...	...	...
Ironton	11,868	143	12.05	27	15	26	3	...	...	...	...	1	...	2
Kenton	6,852	111	16.20	12	10	30	...	4	...	...	...	...	6	...
Lancaster	8,991	163	18.13	5	...	16	1	2	...	...	...	...	...	...
Lima	21,723	330	15.19	45	29	59	6	17	1	1	9	...	6	...
Lorain	16,028	233	14.54	73	24	39	4	11	...	...	...	...	...	...
Mansfield	17,640	138	7.82	16	6	24	...	...	3	6	1	...	1	...
Marietta	13,348	194	14.53	22	18	43	...	6	1	...	...	...	...	...
Marion	11,862	189	15.93	32	11	34	3	3	...	...	...	...	1	1
Martins Ferry	7,760	112	14.43	11	8	20	3	...	1	1	...	...	...	...
Massillon	11,944	125	10.47	22	4	14	4	4	1	...	...	3	...	...
Middletown	9,215	104	11.29	14	14	19	5	2	...	...	...	...	...	...
Mt. Vernon	6,633	...	...	...	...	...	...	...	...	...	...	...	...	...
Nelsonville	5,421	79	14.57	14	7	21	...	3	...	...	...	...	1	...
Newark	18,157	220	12.12	38	12	28	4	4	...	...	1	2	...	...
Newburg	5,909	...	...	...	...	...	...	...	...	...	...	...	...	...
New Philadelphia	6,213	72	11.59	4	2	9	1	...	...	...	1	...	...	...
Niles	7,468	...	...	...	...	...	...	...	...	...	...	...	...	...
Norwalk	7,074	90	12.72	16	5	6	...	...	...	...	...	...	...	...
Norwood	6,480	77	11.88	14	5	12	1	...	...	...	4	...	...	...
Painesville	5,024	76	15.13	10	7	12	...	4	3	1	...	...	...	...
Piqua	12,172	...	...	...	...	...	...	...	...	...	...	...	...	...
Portsmouth	17,870	231	12.93	45	45	90	4	3	...	...	2	1	1	2
St. Marys	5,359	75	13.99	21	10	17	1	1	...	...	3	3	...	...
Salem	7,582	117	15.43	8	4	17	...	2	3	1	...	...	...	...
Sandusky	19,664	244	12.41	31	16	44	1	3	5	...	...	...	1	1
Sidney	5,688	83	14.59	6	11	10	...	2	...	...	...	1	...	...
Springfield	38,253	526	13.75	61	19	54	2	2	...	1	4	...	...	...
Steubenville	14,349	...	...	...	...	...	...	...	...	...	...	...	...	...
Tiffin	10,989	128	12.56	10	11	18	8	...	...	...	...	1	1	1
Toledo	131,822	1,849	14.03	325	206	374	117	...	...	129	3	3	4	...
Troy	5,881	89	15.13	3	3	26	11	3	...	...	...	...	...	...
Urbana	6,808	69	10.14	4	1	6	...	...	...	...	...	...	...	...
Van Wert	6,422	67	10.43	...	...	6	...	...	...	...	...	...	...	...
Warren	8,529	108	12.66	9	6	20	1	2	...	3	1	...	...	...
Washington C. H.	5,751	76	13.22	16	5	7	...	...	...	...	...	1	...	...

ABSTRACT OF THE REPORTS OF DEATHS AND

Cities over 5,000 Population. Census 1900.	Population.	Total deaths.	Annual rate per 1,000.	Total under one year.	Total under five years and over one year.	Total Zymotic Diseases.	Croup and Diphtheria.	Cholera Infantum.	Cerebro-Spinal Meningitis.	Cholera Morbus.	Diarrheal Diseases.	Dysentery.	Malarial Fever.	Measles.
Wellston	8,045	121	15.04	18	11	16	1	1	....	....	....	4	8	....
Wellsville	6,136	135	22.00	36	2	44	2	4	7	1	4	4	....	....
Wooster	6,063	....	....	....	....	....	....	....	....	....	....	....	....	....
Xenia	8,696	127	14.60	7	4	31	2	....	1	....	1	1	....	....
Youngstown	44,885	842	18.76	194	72	200	12	30	25	1	....	2	4	....
Zanesville	23,538	347	14.74	32	14	64	....	10	2	....	2	1	1	3
Total	1,739,388	27,388	15.75	4,824	1,962	4,810	541	322	143	12	1,080	132	38	81

ABSTRACT OF THE REPORTS OF DEATHS

350 Villages. Census 1900.		Population.	Total deaths.	Annual rate per 1,000.	Total under one year.	Total under five years and over one year.	Total Zymotic Diseases.	Croup and Diphtheria.	Cholera Infantum.	Cerebro-Spinal Meningitis.	Cholera Morbus.	Diarrheal Diseases.	Dysentery.	Malarial Fever.	Measles.
Aberdeen	711	3	4.22				2								
Ada	2,576	16	6.21				1								
Addyston	1,513	27	17.84				6		1						
Andover	815	11	13.49												
Ansonia	676	8	11.82												
Apple Creek	387	6	15.50												
Arcadia	425	3	7.06												
Arcanum	1,225	17	13.88												
Archbold	958	6	6.26												
Arlington	738	17	23.03		1	1			1	1					
Ashley	700	13	18.57												
Ashland	4,087	40	9.79				6								
Ashville	654	7	10.70							1	1				
Athens	3,066	88	28.70			9	17	2						2	
Attica	694	9	12.97				1								
Avon	500	15	30.00		1	1	1			1					
Bainbridge	954	14	14.67		2		1								
Bakersville	200	4	20.00												
Barbertown	4,354	60	13.78		14	8	9	3						1	2
Beallsville	554	6	10.85				1								
Beaver	262	1	3.82												
Beaverdam	477	3	6.29												
Bedford	1,486	57	38.36		3	2	11								
Bellecenter	962	11	11.43		1	1	4		1	2					
Belmont	422	2	4.74		1										
Belpre	900	13	14.44		1	1	4		1						
Berlin Heights	625	2	3.20												
Berne	164	1	6.09												
Bethel	850	12	14.12				1							1	
Blakeslee	239	4	16.72				2								
Blanchester	1,788	33	18.45		2		8			1					
Bloomington	636	6	9.43							1					
Bluffton	1,783	12	6.73		1	1	3	1							
Bolivar	700	1	1.43				1							1	
Bowenston	526	4	7.60		1	1	1								
Bradner	1,148	16	13.94				2								
Bradford	1,254	8	6.38		1		5								
Bridgeport	3,963	60	15.14		12	8	19	4	6	4					
Brinkhaven	250	2	8.00												
Brooklyn	2,343	29	12.38		5	5	14	7	3						
Brooklyn Heights	260	1	3.85												
Brookville	869	17	19.56				1		1						
Bryan	3,131	47	11.82		4	3	7	2	1					1	
Buchtel	1,000	9	9.00				4								
Burbank	325	3	9.23												
Burkettsville	250	2	8.00		1		1		1						
Butler	567	6	10.58												
Byesville	1,267	26	20.52		1		12		1						1
Cadiz	1,755	26	14.81			2	5	1	1	1					
Caldwell	927	22	23.73		2		5								
Caledonia	682	5	7.33												
Camden	905	20	22.10		1		6	1	1						
Canal Fulton	1,172	11	9.39				2								
Cannellville	281	8	28.47		1	4	3								2
Carey	1,816	25	13.77		6		1								
Carrollton	1,271	13	10.23		1		2		1						
Carthage	2,559	21	8.21		3		1		1						
Casstown	262	1	3.82				1								
Cedarville	1,189	15	12.62		3										
Celina	2,815	26	8.88		3	5	7	1	2						
Centerville	250	2	8.00												
Chagrin Falls	1,586	30	18.92				5							1	
Chardon	1,360	20	14.71												
Cheviot	800	2	2.50				1								
Clarington	905	10	11.05				1								
Clarksville	465	5	10.75		1	1	2	1	1						

ANNUAL REPORT

ABSTRACT OF THE REPORTS OF DEATHS

Villages. Census 1900.	Population.	Total deaths.	Annual rate per 1,000.	Total under one year.	Total under five years and over one year.	Total Zymotic Diseases.	Croup and Diphtheria.	Cholera Infantum.	Cerebro-Spinal Meningitis.	Cholera Morbus.	Diarrheal Diseases.	Dysentery.	Malarial Fever.	Measles.
Cleveland Heights	500	4	8.00	...	...	1	1	...	...	...	...	...	...	...
Cleves	1,328	19	14.31	4	1	3	2	...	...	...	...	...	...	...
Clyde	2,515	27	10.74	2	...	3	...	...	...	...	...	...	...	...
Coalgrove	1,191	11	9.24	...	...	5	...	...	...	...	...	...	1	...
Collinwood	3,639	103	28.30	1	5	11	4	...	...	...	...	...	...	...
Columbiana	1,339	11	8.22	1	1	1	...	...	...	...	...	...	...	...
Columbus Grove	1,935	28	14.71	...	...	7	1	...	1	...	...	...	...	...
Commercial Point	245	1	.08	...	...	...	...	...	...	...	...	...	...	...
Congress	198	2	10.10	...	...	...	...	...	...	...	...	...	...	...
Convey	690	5	7.25	1	...	1	1	...	...	...	...	...	...	...
Corning	1,401	18	12.85	3	...	4	4	...	1	...	...	...	...	...
Covington	1,791	25	13.40	...	...	1	1	...	...	...	...	...	...	2
Crestline	3,382	45	13.71	5	1	5	...	2	...	...	1	...	...	...
Creston	893	11	12.32	1	...	...	...	...	...	...	...	...	...	...
Cridersville	581	3	5.16	...	1	...	...	...	...	...	...	1	...	...
Croton	414	8	19.32	...	...	...	2	...	...	...	...	...	...	...
Crown City	284	2	7.04	...	...	...	...	...	...	...	...	...	...	...
Cumberland	618	4	6.47	...	...	1	...	...	...	...	...	...	...	...
Custar	293	4	13.65	2	...	...	...	...	...	...	...	...	...	...
Cuyahoga Falls	3,186	38	11.93	2	2	4	1	...	...	...	...	...	1	...
Dalton	686	5	7.51	...	...	1	...	...	...	...	...	...	...	...
Degraff	1,150	6	5.22	...	...	1	...	...	...	...	...	...	...	...
Dellroy	400	4	1.00	...	...	...	...	...	...	...	...	...	...	...
Delphos	4,517	66	14.61	6	2	16	...	1	1	1	...	...	...	...
Delta	1,230	2	1.63	...	...	2	...	...	...	...	...	...	...	...
Dennison	3,763	50	13.29	13	2	11	1	2	...	...	...	...	...	...
Deshler	1,628	3	1.84	...	...	1	...	...	...	...	...	1	...	...
Dexter City	278	1	3.60	...	...	...	...	...	...	...	...	...	...	...
Dillonvale	2,000	21	10.50	...	...	15	1	7	1	...	...	...	...	1
Doylestown	1,057	7	6.62	...	...	...	...	...	...	...	...	...	...	...
Dresden	1,600	17	10.62	2	...	3	3	2	...	...	...	...	...	...
Dunkirk	1,222	20	16.37	2	1	5	...	3	...	...	...	...	...	...
DuPont	370	4	10.80	...	...	...	...	...	...	...	...	...	...	...
East Cleveland	2,757	36	13.12	...	1	8	...	...	1	...	...	...	...	...
East Palestine	2,493	30	12.03	2	...	1	...	...	...	...	...	...	...	...
East Springfield	225	3	1.33	...	...	...	...	...	...	...	...	...	...	...
Edgerton	1,043	11	10.55	...	4	2	...	2	...	...	...	...	...	...
Edon	740	11	14.87	...	3	1	...	...	...	...	...	...	...	...
Elmore	1,025	11	10.73	...	...	...	...	...	...	...	...	...	...	...
Elmwood Place	2,532	23	8.69	3	2	3	...	1	...	...	...	1	...	...
Fairport	2,073	41	19.78	9	...	13	...	8	...	...	1	1	1	...
Farmersville	440	7	15.91	...	...	...	...	...	...	...	...	...	...	...
Fayette	886	8	9.14	...	...	1	...	...	...	...	...	...	...	...
Felicity	695	9	12.95	1	...	...	...	...	...	...	...	...	...	...
Fletcher	375	6	16.00	...	...	...	...	...	...	...	...	...	...	...
Forest	1,155	9	7.79	...	...	1	...	...	...	...	...	...	...	...
Fort Recovery	1,097	5	4.56	1	...	2	...	...	...	...	...	...	...	...
Fort Jennings	322	6	18.62	...	...	3	...	2	...	...	...	...	...	...
Frankfort	717	10	13.95	...	...	3	...	1	...	...	...	...	...	...
Franklin	2,724	37	13.58	4	2	2	...	1	...	...	...	...	...	...
Fredricktown	890	9	10.11	...	...	...	...	...	...	...	...	...	...	...
Freeport	690	6	8.70	...	...	2	...	...	...	...	...	...	...	...
Gahanna	276	7	25.36	...	...	...	...	...	...	...	...	...	...	...
Gambler	751	3	3.98	...	...	1	...	...	...	...	...	...	...	...
Geneva	2,342	36	15.37	1	...	3	...	1	...	...	...	...	1	...
Georgetown	1,529	19	12.43	1	...	2	...	...	...	...	...	...	...	...
Germantown	1,702	25	14.69	...	...	...	...	...	...	...	...	...	...	...
Gibsonburg	1,791	22	12.28	...	...	4	...	...	...	...	...	...	...	...
Girard	2,630	31	11.79	13	1	3	...	1	...	...	1	...	...	...
Glendale	1,545	19	12.30	1	1	3	...	1	...	...	...	...	...	...
Grafton	1,098	10	9.11	...	4	3	2	...	...	...	1	...	...	...
Grand Rapids	549	8	14.57	1	...	1	...	...	...	...	1	...	...	...
Greenfield	3,979	17	4.27	...	...	12	9	...	...	...	...	...	...	...
Greenwich	849	6	10.67	1	...	2	1	...	...	...	...	...	...	...
Grove City	656	10	15.24	4	1	...	...	...	...	...	...	...	...	...
Groveport	519	8	15.41	1	...	1	...	1	...	...	...	...	...	...
Hamden	838	3	3.58	...	1	...	...	...	...	...	...	...	...	...

ABSTRACT OF THE REPORTS OF DEATHS

Villages. Census 1900.	Population.	Total deaths.	Annual rate per 1,000.	Total under one year.	Total under five years and over one year.	Total Zymotic Diseases.	Croup and Diphtheria.	Cholera Infantum.	Cerebro-Spinal Meningitis.	Cholera Morbus.	Diarrheal Diseases.	Dysentery.	Malarial Fever.	Measles.
Hamler	574	4	6.97	..	..	1	..	1	..	..	..	..	..	..
Hanging Rock	665	8	12.03	..	..	1	..	..	..	..	..	..	..	..
Hanover	314	4	12.74	..	..	..	..	..	..	..	..	..	..	..
Harrisburg	247	3	12.14	..	..	..	..	..	..	..	..	..	..	..
Harrod	370	3	8.11	..	..	..	..	..	..	..	..	..	..	..
Hartwell	1,833	15	8.18	..	..	..	..	..	..	..	..	..	..	..
Haskins	449	5	11.14	..	..	..	..	..	..	..	..	..	..	..
Hicksville	2,520	6	2.38	..	..	1	..	..	..	..	..	..	..	..
Higginsport	650	4	6.15	..	..	..	..	..	..	..	..	..	..	..
Hillsboro	4,535	69	15.21	4	4	6	..	1	3	..	..	..	..	..
Hiram	659	5	9.10	1	..	..	..	..	..	..	..	..	..	..
Hollansburg	275	4	14.55	..	..	..	..	..	..	..	..	..	..	..
Holmesville	304	5	16.45	..	..	..	..	..	..	..	..	..	..	..
Hubbard	1,230	9	7.32	..	..	..	..	..	..	..	..	..	..	..
Hudson	983	17	17.29	..	1	4	3	..	..	..	..	..	..	..
Huntsville	408	6	14.71	..	..	..	1	..	..	..	..	..	..	..
Huron	1,708	6	3.51	..	..	..	..	..	..	..	..	..	..	..
Jackson	4,672	91	19.48	..	..	..	..	..	..	..	..	..	..	..
Jamestown	1,205	8	6.64	1	..	1	..	..	..	..	..	..	..	..
Jeffersonville	790	15	18.96	..	..	6	..	..	..	..	..	..	..	1
Jenera	237	2	8.42	..	..	1	1	..	..	..	..	..	..	..
Jewett	743	10	13.46	..	..	1	..	..	..	..	..	..	..	..
Junction City	443	3	6.77	..	..	1	..	..	..	..	..	..	..	..
Kalida	622	10	16.08	3	..	..	..	..	..	..	..	..	..	..
Kent	4,541	76	16.74	..	..	1	..	..	..	..	..	..	..	..
Killbuck	370	5	13.51	1	..	..	..	..	..	..	..	..	..	..
Lakewood	3,355	50	14.99	4	..	14	..	..	..	..	..	..	..	..
Larue	297	6	6.02	1	..	1	..	..	..	..	..	..	..	..
Laura	378	9	23.81	..	..	2	..	..	..	..	..	..	..	..
Lebanon	2,867	34	11.86	..	..	11	1	..	..	..	..	..	..	..
Leesburg	783	2	2.55	..	1	1	..	..	..	..	..	..	..	..
Leetonia	2,744	39	14.21	..	5	9	1	..	1	..	..	..	..	..
Leipsic	1,726	10	5.79	..	1	3	..	..	..	..	..	..	..	..
Lewisburg	560	5	8.93	..	..	..	..	..	..	..	..	..	..	..
Lithopolis	358	6	16.76	..	..	..	..	..	..	..	..	..	..	..
Lockland	2,695	31	11.50	6	1	3	1	..	..	..	..	1	..	..
Lodi	846	17	20.09	2	..	6	1	..	..	..	..	..	..	..
Loudonville	1,581	28	17.71	6	1	6	1	..	..	..	..	..	..	..
Louisville	1,374	16	11.64	3	1	2	..	..	..	..	..	..	..	1
Loveland	1,260	12	9.52	1	1	2	..	..	..	..	..	..	..	..
Lowell	381	4	10.49	..	..	..	..	..	..	..	..	..	..	..
Lowellville	1,137	17	14.95	3	3	1	..	..	..	..	..	..	..	..
Lynchburg	907	11	12.13	..	..	3	..	..	..	..	..	..	..	..
McArthur	941	7	7.43	..	..	3	..	..	..	..	..	..	..	..
McComb	1,195	16	13.39	..	..	1	1	..	..	..	..	..	..	..
McConnellsville	1,825	45	24.66	2	3	9	1	..	..	..	..	..	..	..
Macksburg	448	9	20.09	..	..	6	6	..	..	..	..	..	..	..
Madison	768	7	9.11	..	..	..	..	..	..	..	..	..	..	..
Malvern	709	7	9.87	..	1	1	..	..	..	..	..	..	..	..
Manchester	2,063	37	18.47	7	3	1	..	..	..	..	..	..	..	..
Marengo	242	2	8.26	..	..	..	..	..	..	..	..	..	..	..
Maumee	1,856	18	9.70	..	..	1	..	..	..	..	..	..	..	..
Mechanicsburg	1,617	21	14.84	3	..	2	..	..	1	..	..	..	..	..
Medina	2,232	47	21.06	3	1	8	1	3	..	..	..	..	..	..
Medrose	383	2	5.22	..	..	..	..	..	..	..	..	..	..	..
Mendon	599	6	10.02	2	..	..	..	..	..	..	..	..	..	..
Montor	624	13	20.83	..	..	1	..	..	..	..	..	..	..	..
Miamisburg	3,941	46	11.67	1	..	10	..	1	..	..	..	..	..	..
Middleport	2,796	60	21.44	6	6	9	..	1	..	..	1	..	1	..
Milford	1,149	8	6.96	..	2	1	..	..	..	..	..	..	..	..
Milford Center	682	7	10.26	..	..	1	1	..	..	..	..	..	..	..
Millbury	281	3	10.56	1	..	..	..	..	..	..	..	..	..	..
Milledgeville	201	3	14.93	..	..	1	..	..	..	..	..	1	..	..
Millersburg	1,998	29	14.51	1	..	4	..	..	..	..	..	..	..	..
Mineral City	1,220	19	15.57	2	2	8	..	4	1	1
Mineral Ridge	831	13	15.61	2

AND THEIR CAUSES DURING 1902—Continued.

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ABSTRACT OF THE REPORTS OF DEATHS

Villages. Census 1900.	Population.	Total deaths.	Annual rate per 1,000.	Total under one year.	Total under five years and over one year.	Total Zymotic diseases.	Cerebro-Spinal Meningitis.	Cholera Infantum.	Cerebro-Spinal Meningitis.	Cholera Morbus.	Diarrheal Diseases.	Dysentery.	Malarial Fever.	Measles.
Reynoldsburg.....	339	17	50.15	3	.....	1	.....	.....	.....	.....	.....	.....	.....	.....
Lichwood.....	1,640	13	7.93	2	.....	3	.....	2	1	.....	.....	.....	.....	.....
Ridgeway.....	447	12	4.47	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Rising Sun.....	660	6	9.08	.....	.....	1	.....	.....	.....	.....	.....	.....	.....	.....
Rockport.....	2,038	21	10.30	1	.....	9	4	1	.....	.....	.....	.....	.....	.....
Rocky Ridge.....	414	3	7.25	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Rocky River.....	1,319	5	3.87	.....	.....	1	1	.....	.....	.....	.....	.....	.....	.....
Rogers.....	287	8	27.87	.....	.....	1	.....	.....	.....	.....	.....	.....	.....	.....
Roseville.....	1,207	3	2.49	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Rushville.....	257	3	11.67	1	.....	1	.....	.....	.....	.....	.....	.....	.....	.....
Rushsylvania.....	552	1	1.81	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Sabina.....	1,481	6	4.05	1	2	3	2	.....	1	.....	.....	.....	.....	.....
Salesville.....	286	1	3.49	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
St. Bernard.....	3,384	14	4.13	.....	.....	2	.....	.....	.....	.....	.....	.....	.....	.....
St. Clairsville.....	1,210	17	14.05	2	.....	4	2	.....	.....	.....	.....	.....	.....	.....
St. Paris.....	1,222	12	9.82	1	.....	3	.....	.....	.....	.....	.....	.....	.....	.....
Salineville.....	2,353	42	17.85	5	.....	5	1	4	.....	.....	.....	.....	.....	.....
Scio.....	1,214	4	3.29	1	.....	3	1	1	.....	.....	.....	1	.....	.....
Scott.....	547	10	18.28	.....	1	3	.....	.....	.....	.....	.....	.....	.....	.....
Sebring.....	1,750	12	6.80	.....	2	3	.....	1	1	.....	.....	.....	.....	.....
Senecaville.....	823	4	6.42	.....	.....	4	.....	.....	.....	.....	.....	.....	.....	.....
Shawnee.....	2,966	27	9.10	1	1	1	.....	.....	.....	.....	.....	.....	.....	.....
Shelby.....	4,685	41	8.75	4	5	8	3	2	.....	.....	.....	.....	.....	.....
Shreve.....	1,043	14	13.42	3	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Smithfield.....	503	6	11.93	.....	.....	1	.....	.....	.....	.....	.....	.....	.....	.....
Smithville.....	474	21	44.30	.....	.....	4	.....	.....	1	.....	.....	.....	.....	.....
Somerville.....	300	8	26.66	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
South Bloomfield.....	223	5	22.42	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
South Charleston.....	1,096	17	15.51	1	1	1	.....	.....	.....	.....	.....	.....	1	.....
South Lebanon.....	484	8	16.53	.....	2	2	2	.....	.....	.....	.....	.....	.....	.....
South Point.....	281	2	7.12	.....	1	1	.....	.....	.....	.....	.....	.....	.....	.....
South Zanesville.....	549	9	16.39	.....	.....	2	.....	.....	.....	.....	.....	.....	1	.....
Springboro.....	433	13	30.02	.....	.....	1	.....	.....	.....	.....	.....	.....	.....	.....
Spring Valley.....	522	4	7.66	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Strasburg.....	461	6	13.02	.....	1	3	.....	.....	1	.....	.....	.....	.....	.....
Struthers.....	2,500	6	2.40	.....	.....	1	1	.....	.....	.....	.....	.....	.....	.....
Stryker.....	1,206	10	8.29	1	.....	3	.....	1	1	.....	.....	1	.....	.....
Sugar Grove.....	350	2	5.67	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Summerfield.....	511	6	11.74	.....	.....	1	1	.....	.....	.....	.....	.....	.....	.....
Sycamore.....	853	12	15.24	2	3	3	.....	.....	2	.....	.....	.....	.....	.....
Sylvania.....	617	7	11.35	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Thornville.....	374	3	8.02	1	.....	1	.....	.....	.....	.....	.....	.....	.....	.....
Tippecanoe City.....	1,703	16	9.39	.....	.....	4	.....	.....	.....	.....	.....	.....	.....	.....
Tiro.....	293	6	20.47	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Trenton.....	387	5	12.92	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Uhrichsville.....	4,582	28	6.11	11	7	3	.....	2	.....	.....	.....	.....	.....	.....
Union City.....	1,282	19	14.82	1	.....	7	1	.....	.....	.....	.....	1	.....	.....
Unifopolis.....	300	3	10.00	.....	2	2	.....	.....	.....	.....	.....	.....	.....	.....
Utica.....	825	9	10.89	.....	1	1	1	.....	.....	.....	.....	.....	.....	.....
Van Buren.....	367	2	5.45	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Vandalia.....	284	1	3.52	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Vermillion.....	1,184	22	10.14	1	1	5	.....	.....	.....	.....	.....	.....	.....	.....
Versailles.....	1,478	21	14.20	.....	.....	1	.....	.....	.....	.....	.....	.....	.....	.....
Vienna X Roads.....	325	3	9.23	1	.....	.....	.....	1	.....	.....	.....	.....	.....	.....
Vinton.....	304	4	13.16	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Wadsworth.....	1,764	43	24.38	12	1	2	.....	.....	.....	.....	.....	.....	.....	.....
Wapakoneta.....	3,915	52	13.28	9	3	6	.....	.....	1	.....	.....	.....	.....	.....
Washington.....	374	2	5.35	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Waverly.....	1,854	11	5.94	1	.....	1	.....	1	.....	.....	.....	.....	.....	.....
Waynesburg.....	613	7	11.42	.....	4	.....	.....	1	.....	.....	.....	.....	.....	.....
Waynesfield.....	542	2	3.69	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Waynesville.....	723	9	12.45	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Wellington.....	2,044	21	10.02	2	3	1	.....	.....	.....	.....	.....	.....	.....	.....
West Carrollton.....	987	7	7.09	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Westerville.....	1,462	14	9.58	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
West Jefferson.....	803	16	19.92	.....	.....	2	.....	.....	.....	.....	.....	2	.....	.....

ABSTRACT OF THE REPORTS OF DEATHS

Villages, Census 1900.	Population.	Total deaths.	Annual rate per 1,000.	Total under one year.	Total under five years and over one year.	Total Zymotic Diseases.	Croup and Diphtheria.	Cholera Infantum.	Cerebro-Spinal Meningitis.	Cholera Morbus.	Diarrheal Diseases.	Dysentery.	Malarial Fever.	Measles.
West Liberty	1,236	9	7.28	...	...	1	...	...	...	...	1	...	...	...
West Mansfield	875	11	12.57	1	...	1	...	1	...	...	...	...	...	...
West Milton	904	20	22.12	...	...	...	...	...	...	...	...	...	...	...
Weston	953	2	2.09	1	...	...	...	...	...	...	...	...	...	...
West Salem	656	6	9.15	...	...	1	...	...	...	...	1	...	...	...
West Union	1,033	7	6.78	...	...	1	...	...	1	...	...	...	...	...
West Unity	807	2	2.48	...	...	...	...	...	...	...	...	...	...	...
Wharton	429	3	6.83	...	...	...	...	...	...	...	...	...	...	...
Whitehouse	621	10	16.10	1	...	1	...	...	...	...	...	...	...	...
Williamsport	547	5	9.14	...	...	...	...	...	...	...	...	...	...	...
Willshire	560	6	10.72	...	...	...	...	...	...	...	...	...	...	...
Willoughby	1,753	10	5.70	1	...	1	...	...	...	...	...	...	...	...
Wilmington	3613	26	7.09	1	...	3	...	1	...	...	...	...	...	...
Winchester	793	2	2.51	...	...	...	...	...	...	...	...	...	...	...
Windham	283	4	14.13	...	...	...	...	...	...	...	...	...	...	...
Woodville	831	13	15.64	3	...	...	...	...	...	...	...	...	...	...
Wren	242	1	4.96	...	...	1	...	...	...	...	...	...	...	1
Wyoming	1,450	7	4.83	...	...	1	...	...	...	...	...	...	...	...
Yellow Springs	1,371	9	6.56	...	...	1	...	...	...	...	...	...	...	...
Total	422,612	5,155	12.20	470	235	861	113	143	54	9	29	37	18	19

ABSTRACT OF THE REPORTS OF DEATHS

656 Townships. Census 1900.		Population.	Total deaths.	Annual rate per 1,000.	Total under one year.	Total under five years and over one year.	Total Zymotic Diseases.	Croup and Diphtheria.	Cholera Infantum.	Cerebro-Spinal Meningitis.	Cholera Morbus.	Diarrheal Diseases.	Dysentery.	Malarial Fever.	Measles.
Adams—															
Franklin		1,572	5	3.18			2	1							
Meigs		2,350	7	2.97			4			2					
Oliver		976	7	7.17											
Sprigg		2,203	1	.45			1								
Wayne		1,204	22	18.27		3	1								
Allen—															
Amanda		1,384	7	5.06		2									
Bath		1,517	20	13.18			3								
Jackson		1,615	5	3.10						2					
Marion		2,284	10	4.69		2	1			1					1
Shawnee		1,492	7	4.69		2	4		2						1
Spencer		1,142	8	7.01			2								
Sugar Creek		1,038	3	2.89											
Ashland—															
Green		1,206	28	23.22			4		3						
Jackson		923	9	10.01			3								
Milton		869	8	9.21											
Mohican		1,123	6	5.34	2		2	1		1					
Orange		1,201	7	5.83	1	6							1		
Ruggles		630	9	14.29			2	1							1
Sullivan		808	1	1.24											
Vermillion		1,230	2	1.62											
Ashtabula—															
Andover		719	23	31.99			5								
Ashtabula		1,038	15	14.45	1	1	2	1							
Cherry Valley		643	9	6.22	1	1									
Colebrook		773	12	15.52											
Denmark		703	6	8.54											
Dorset		578	10	11.39											
Geneva		1,254	11	8.77			1								
Harpersfield		893	6	6.72											
Kingsville		1,412	29	20.54		1									
Lenox		742	5	6.73			1								
Morgan		562	6	10.68											
New Lyme		837	3	3.58											
Orwell		981	12	12.23			1								
Plymouth		723	5	6.22											
Richmond		848	6	7.06			1		1						
Trumbull		855	11	12.87			2								
Wayne		685	12	17.52			2								1
Williamsfield		900	5	5.55											
Windsor		911	13	14.27	1										
Athens—															
Ames		1,256	4	3.18	1		2								
Carthage		1,136	14	12.32			3			1					
Dover		1,488	4	2.69	4	2									
Lee		540	2	3.66											
Lodi		1,357	3	2.21											
Rome		1,767	5	2.83			1								
Troy		3,762	4	1.06											
Waterloo		2,508	37	14.75	9		18			2					3
York		3,762	39	10.37	11	2	14			5				2	2
Auglaize—															
Duchouquet		1,636	4	2.44			2								
German		893	2	2.36			1								
Goshen		908	4	4.40			3								
Jackson		731	3	4.10											
Logan		1,473	7	4.75	2		2								
Moulton		1,286	1	.80			1								
Noble		1,360	4	2.94			4	2							
Salem		959	2	2.09			1								
Washington		1,193	1	.81											
Belmont—															
Goshen		2,047	31	15.14	6		3		1	1					
Mead		1,726	2	1.16			2								2

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Coshocton—														
Adams	968	4	4.13											
Bethlehem	730	12	16.44											
Clark	950	1	1.05			1			1					
Franklin	1,137	12	10.55											
Jackson	1,696	4	2.36			1								
Keene	799	18	22.53											
Lafayette	1,393	1	0.72			1								
Linton	1,216	4	3.29			1								
Monroe	909	5	5.50		1	1								
New Castle	924	4	4.33											
Tuscarawas	1,066	14	13.13			7	4	1						
White Eyes	1,033	10	9.68		2									
Crawford—														
Holmes	1,500	5	3.33	1		2								
Jefferson	697	6	8.61	1										
Liberty	1,566	18	11.43			10	2	2				1		
Lykens	930	5	5.38		1									
Sandusky	569	5	8.79											
Texas	516	5	9.69											
Vernon	926	5	5.39											
Cuyahoga—														
Bedford	1,140	9	7.89			2							2	
Brecksville	1,053	7	6.65		1	1								
Dover	2,233	16	7.16	3		3	2						1	
Eucld	2,634	27	10.25	4	1	5	1				1		1	
Middleburgh	2,525	27	10.69											
Olmsted	1,614	8	4.96			3					1		1	
Parma	1,488	1	0.67			1	1							
Royalton	1,128	8	7.09	1		1	1							
Strongsville	1,178	22	18.67		2	5	12							
Warrensville	1,634	12	7.34											
Darke—														
Adams	1,954	22	11.26	2	5	3			1					
Brown	1,263	23	18.21	2	4	5		1				1		
Butler	1,659	15	9.04			1			1					
Franklin	1,635	8	4.90	1	2	12	1							
German	1,376	5	3.63			5								
Greenville	2,940	19	6.46	2	1	2		1					1	
Harrison	1,212	10	8.25			3		1				1		
Jackson	1,516	7	4.62			1								
Mississinawa	1,402	6	4.28		2	2		2						
Monroe	1,352	7	5.18	1										
Patterson	1,475	13	8.81			1		1						
Richland	1,217	4	3.29			1								
Twin	1,448	23	15.88			14		4						
Van Buren	1,486	34	22.89	7	9									
Wabash	1,334	9	6.75											
Wayne	1,371	8	5.83	1										
York	942	4	4.25											
Defiance—														
Highland	1,511	2	1.32			2								
Mark	1,685	6	3.56											
Richland	1,444	1	0.69			1								
Tiffin	1,514	6	3.96			1			1					
Washington	1,265	6	4.74			1								
Delaware—														
Genoa	922	4	4.34											
Harlem	1,005	8	7.96		1									
Orange	976	6	6.15	2		1		1						
Porter	738	2	2.71											
Radnor	1,133	7	6.18			5						2		
Trenton	869	8	9.21			12								
Eric—														
Florence	1,096	2	1.82											
Huron	726	10	13.77			1								

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Erie—														
Kelley's Island	1,174	12	10.32	4	1	1
Margaretta	2,751	12	4.34	1	7
Oxford	950	4	4.11
Perkins	3,063	4	1.36	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Fairfield—														
Berne	2,031	6	2.95	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Bloom	1,500	16	10.67	12	.....	1	.....	.....	.....	.....	.....	.....	.....	.....
Clear Creek	1,810	19	10.49	.....	.....	1	.....	.....	.....	.....	.....	.....	.....	.....
Greenfield	1,563	18	11.52	.....	.....	2	.....	1	.....	.....	.....	12	.....	.....
Hocking	2,313	16	6.92	.....	.....	1	.....	.....	1	.....	.....	.....	.....	.....
Madison	1,127	9	7.99	5	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Richland	956	4	4.19	.....	.....	12	.....	.....	1	.....	.....	.....	.....	.....
Walnut	2,199	10	4.59	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Fayette—														
Concord	733	4	5.43	.....	.....	12	.....	.....	.....	.....	.....	.....	.....	.....
Green	701	4	5.71	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Jasper	1,446	8	5.53	.....	.....	4	.....	1	.....	.....	.....	1	.....	1
Marion	932	8	8.58	.....	.....	12	.....	.....	.....	.....	.....	.....	.....	.....
Union	2,617	1	1.38	.....	.....	1	.....	.....	.....	.....	.....	.....	.....	.....
Franklin—														
Blendon	898	1	1.11	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Marion	5,513	1	1.18	.....	.....	1	.....	.....	.....	.....	.....	.....	.....	.....
Norwich	1,105	8	7.24	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Perry	1,676	19	11.34	3	.....	12	.....	.....	.....	.....	.....	.....	.....	.....
Prairie	1,582	15	9.48	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Sharon	1,256	13	9.59	.....	.....	12	.....	.....	.....	.....	.....	.....	.....	.....
Washington.....	967	5	5.18	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Fulton—														
Franklin	1,138	1	1.88	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Royalton	1,198	5	4.17	.....	.....	1	.....	.....	.....	.....	.....	.....	.....	.....
Gallia—														
Cheshire	1,851	15	8.10	.....	.....	6	.....	2	.....	.....	.....	.....	.....	2
Clay	1,107	4	3.61	.....	.....	4	.....	.....	.....	.....	.....	.....	.....	.....
Green	1,257	12	9.55	3	.....	1	.....	.....	.....	.....	.....	.....	.....	.....
Greenfield	1,223	9	7.18	.....	.....	1	.....	1	.....	.....	.....	.....	.....	.....
Morgan	1,222	7	5.68	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Perry	1,177	16	13.59	.....	.....	.....	.....	.....	1	.....	.....	.....	.....	.....
Raccoon	1,273	9	7.07	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Springfield	1,844	4	2.17	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Geauga—														
Bainbridge	758	4	5.28	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Chester	716	9	12.57	.....	.....	1	.....	.....	.....	.....	.....	.....	.....	.....
Claridon	764	8	10.47	.....	.....	.....	.....	.....	.....	.....	.....	.....	1	.....
Hampden	603	3	4.97	.....	.....	.....	.....	.....	.....	.....	1	.....	.....	.....
Huntsburg	809	12	14.83	1	12	.....	1	1	.....	.....	.....	.....	.....	.....
Munson	780	5	6.41	.....	.....	1	.....	.....	.....	.....	.....	.....	.....	.....
Parkman	849	9	10.60	.....	.....	3	.....	.....	.....	.....	.....	1	.....	.....
Russell	695	8	11.52	.....	8	3	.....	1	.....	.....	.....	.....	.....	.....
Troy	897	13	14.49	2	3	4	4	.....	.....	.....	.....	.....	.....	.....
Greene—														
Beaver Creek	2,070	5	2.42	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Caesar Creek	1,039	4	3.85	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Cedarville	1,278	9	7.04	3	1	4	.....	.....	.....	.....	.....	.....	.....	.....
Jefferson	1,158	2	1.73	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
New Jasper	874	5	5.72	.....	.....	1	.....	1	.....	.....	.....	.....	.....	.....
Ross	1,141	3	2.63	.....	.....	1	.....	.....	.....	.....	.....	.....	.....	1
Guernsey—														
Adams	717	5	6.97	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Center	1,871	6	3.29	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1
Jackson	1,198	17	14.19	.....	.....	8	1	1	.....	.....	.....	.....	.....	.....
Jefferson	724	8	11.05	7	1	.....	.....	.....	.....	.....	.....	.....	.....	.....
Liberty	1,054	10	9.49	1	1
Valley	1,396	1	1.50	1
Westland	711	2	2.82
Wills	1,045	3	2.87	2

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Huron--														
Norwich	824	7	8.50											
Townsend	977	7	7.16											
Jackson--														
Madison	1,328	25	19.58	3	4	1		1			2			
Milton	2,304	3	1.30			3	1							
Jefferson--														
Mt. Pleasant	3,060	19	6.21	5		4	2					2		
Springfield	1,078	13	12.06			12	9	1						
Knox--														
Berlin	751	15	19.97											
Burler	694	9	13.11			1		1						
Harrison	588	2	3.40											
Jackson	798	8	10.02			4						1		1
Milford	762	4	5.25											
Miller	755	11	14.57		1									
Monroe	807	5	6.19											
Morgan	650	6	9.22											
Morris	858	6	6.99											
Pike	1,163	7	6.86		1									
Pleasant	818	7	8.56	1	1									
Lake--														
Concord	706	4	5.67			1								
Kirtland	1,135	5	4.40	1		1		1						
Madison	1,952	30	15.37			4								2
Painesville	1,853	20	10.79			2	1							
Perry	1,687	6	3.56	1		2			1					
Willoughby	1,885	13	6.90			1								
Lawrence--														
Decatur	1,663	6	5.64	2		2	2							
Elizabeth	2,879	22	7.64		1	2		1					1	
Fayette	1,957	23	1.53			3								
Lawrence	1,958	23	1.53			3								
Mason	1,921	1	5.22			1								
Perry	1,821	11	6.04			6								
Rome	2,776	2	7.2			2								
Union	2,594	1	3.39			1								
Upper	1,849	2	1.08			2								
Washington	659	6	9.10		1									
Licking--														
Burlington	922	6	6.51											
Eden	629	1	1.61											
Etna	955	7	7.33	1	6									
Fallsburg	826	3	3.59											
Granville	974	5	5.13											
Hanover	983	4	4.07											
McKean	824	8	9.71			1								
Madison	1,163	8	7.25											
Newark	1,198	2	1.67											
St. Albans	766	2	2.61											
Logan--														
Jefferson	1,121	4	3.57			2	1							
McArthur	940	4	4.26	1										
Miami	657	1	1.52											
Perry	1,047	13	12.42	3		1						1		
Pleasant	978	4	4.00	1		2								1
Stokes	1,471	2	1.36											
Union	774	4	5.17	1										
Zane	636	9	14.15		1	5			1			1		
Lorain--														
Brighton	490	9	18.37	1										
Brownhelm	1,100	6	5.45			1			1					
Eaton	958	6	6.26	4		1								
Grafton	848	2	2.36											
La Grange	948	6	6.33			1			1					

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Lorain—															
	Penfield	618	6	9.71			1	1							
	Pittsfield	782	11	14.07		1	3		1	1					1
	Rochester	402	13	32.34			1								
	Russia	981	1	1.02											
Lucas—															
	Adams	2,090	13	6.22	2	2	1								
	Oregon	2,702	20	7.46			4								
	Providence	1,270	4	3.15	1	1	4			2	1				
	Springfield	953	3	3.15	1	1	1			1					
	Sylvania	1,270	13	10.24			5			1					
	Washington	3,449	27	7.83	3	2	4	2		1			1		
Madison—															
	Canaan	881	3	3.41			1	1							
	Deer Creek	882	15	17.01	4	2	4		3	1					
	Jefferson	1,236	11	8.90	1		1								
	Pike	660	5	7.58	1		1								
	Pleasant	1,158	1	.86			1								
Mahoning—															
	Austintown	1,695	2	1.18	1		2		1						
	Beaver	1,929	8	4.15											
	Berlin	725	8	11.03											
	Boardman	863	3	3.48											
	Hillsworth	663	6	9.04			1								
	Goshen	1,406	10	7.11		1	1	1							
	Jackson	903	4	4.43			1								
	Milton	657	2	3.04											
	Youngstown	3,161	2	.63			1	1							
Marion—															
	Bowling Green	978	12	12.27	2		2		1						
	Grand	499	5	10.02			1	1							
	Green Camp	762	3	3.94											
	Marion	1,369	3	2.21			3	1							
	Montgomery	926	9	9.72					1						
	Pleasant	1,169	9	8.11			3								
	Prospect	850	2	2.35											
	Tully	877	9	10.26	1	1	1								
	Waldo	644	7	10.87	1										
Medina—															
	Brunswick	950	2	2.11			1								
	Chatham	904	4	4.42											
	Harrisville	987	3	3.04											
	Hinckley	840	10	11.90		2	1		1						
	Medina	671	3	4.47		1									
	Sharon	1,098	6	5.46		1									
	Spencer	963	8	8.31			1								
	York	983	6	6.10											
Meigs—															
	Chester	1,597	2	1.25			1								
	Columbia	1,016	14	13.78			4			1					
	Letart	1,216	9	7.40			2		1						
	Scipio	1,382	15	10.85			5								
Mercer—															
	Butler	1,438	12	8.34			7	1	4						
	Center	1,493	15	10.05		1	1								
	Hopewell	1,313	4	3.05											
Miami—															
	Bethel	1,596	5	3.13			1								
	Elizabeth	1,124	4	3.56											
	Monroe	1,228	1	.81											
	Newton	1,980	15	7.58	1		2								
	Staunton	1,184	5	4.22											
	Union	2,803	10	3.57			3			3					
Monroe—															
	Franklin	1,112	5	4.50			1								
	Ohio	1,750	9	5.14											

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Monroe—														
Salem	1,095	1	.91	1
Summit	695	22	4.32
Montgomery—														
Butler	1,676	11	6.56	1	1
German	1,658	10	6.03	4	1
Jackson	1,816	13	7.16	4	.....	4	.....	.....	.....	.....	.....	.....	.....	.....
Mad River	2,310	.....	3.03	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Randolph	2,975	12	5.78	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Van Buren	2,957	2	2.71	.....	.....	4	.....	.....	.....	.....	.....	.....	.....	.....
Morgan—														
Center	953	6	6.39	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Deerfield	839	6	7.15	.....	.....	.....	.....	1	.....	.....	.....	.....	.....	.....
Homer	1,426	14	9.82	.....	4	.....	.....	.....	.....	.....	.....	.....	.....	.....
Manchester	585	4	6.84	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Meigsville	1,078	12	11.13	1	.....	.....	.....	.....	1	.....	.....	.....	.....	.....
Morgan	357	.....	5.60	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Penn	1,007	6	5.96	.....	.....	.....	.....	1	.....	1	.....	.....	.....	.....
Windsor	1,745	30	17.19	.....	.....	.....	.....	.....	1	1	.....	.....	.....	.....
York	751	4	5.32	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Morrow—														
Canaan	1,024	6	5.86	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Congress	983	9	9.16	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Harmony	711	12	16.88	.....	.....	12	1	1	.....	1	.....	.....	.....	.....
North Bloomfield	960	9	9.36	.....	.....	1	.....	.....	.....	.....	.....	.....	.....	.....
Perry	935	.....	7.49	.....	.....	.....	1	.....	.....	.....	.....	.....	.....	.....
Peru	865	10	11.56	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Troy	641	11	17.16	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Westfield	948	1	1.05	.....	.....	1	.....	.....	.....	.....	.....	.....	.....	.....
Muskingum—														
Adams	568	3	5.28	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Clay	285	3	10.53	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Falls	1,680	13	7.74	.....	.....	4	3	.....	.....	.....	.....	.....	.....	.....
Highland	974	7	10.39	.....	.....	.....	.....	1	.....	.....	.....	.....	.....	.....
Licking	830	6	7.23	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Madison	900	1	1.11	.....	.....	1	1	.....	.....	.....	.....	.....	.....	.....
Monroe	813	6	7.38	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Newton	1,883	13	6.85	.....	.....	1	.....	.....	.....	.....	.....	.....	.....	.....
Rich Hill	1,219	6	4.92	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Salt Creek	1,024	5	4.88	.....	.....	3	.....	1	.....	.....	.....	.....	1	1
Springfield	1,594	2	1.33	.....	.....	1	.....	.....	.....	.....	.....	.....	.....	.....
Union	817	3	3.67	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Wayne	1,624	11	6.77	.....	.....	6	.....	.....	.....	1	.....	.....	.....	.....
Noble—														
Elk	1,357	4	2.95	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Jackson	1,152	14	12.15	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Jefferson	1,005	6	5.97	.....	.....	1	.....	.....	.....	.....	.....	.....	.....	.....
Olive	1,654	4	2.42	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Seneca	934	3	3.21	.....	.....	1	.....	.....	.....	.....	.....	.....	.....	.....
Sharon	1,024	7	6.82	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Wayne	635	8	12.44	.....	.....	1	.....	.....	.....	.....	.....	.....	.....	.....
Ottawa—														
Allen	1,613	18	11.16	6	1	9	.....	5	1	.....	.....	.....	.....	.....
Benton	2,341	24	10.25	9	.....	5	.....	4	.....	1	.....	.....	.....	.....
Carroll	1,734	4	2.32	.....	.....	1	.....	1	.....	.....	.....	.....	.....	.....
Catawba Island	698	2	3.30	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Erie	616	4	6.49	.....	1	1	.....	.....	1	.....	.....	.....	.....	.....
Harris	1,176	8	6.80	.....	.....	4	2	.....	.....	.....	.....	.....	.....	.....
Put-in-Bay	723	9	12.45	.....	.....	3	.....	.....	.....	.....	.....	.....	.....	1
Paulding—														
Blue Creek	1,967	9	4.58	2
Brown	1,700	17	10.00	9	1	4	3
Harrison	1,797	1	.56
Latty	1,901	3	1.58	* 2	2

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Perry—															
	Bearfield	923	8	8.67	1	1
	Coal	807	8	9.91
	Jackson	1,228	1	.81	1
	Monday Creek	868	6	6.91
	Monroe	3,164	25	7.87	6	.....	13	4	.....	1	.....	.....	.....	.....	.....
	Pleasant	800	5	6.25	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	Reading	1,843	28	15.19	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	Thorn	1,431	14	9.78	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Pickaway—															
	Deer Creek	1,126	14	12.43	.....	.....	.....	1	.....	.....	.....	.....	.....	.....	.....
	Harrison	949	1	1.05	.....	.....	.....	1	.....	.....	.....	.....	.....	.....	.....
	Jackson	1,205	5	4.15	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	Madison	794	4	5.04	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	Washington	1,050	5	4.76	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Pike—															
	Camp Creek	982	3	3.05	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	Jackson	2,021	4	1.98	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	Pebble	1,288	24	18.63	4	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	Seal	797	9	11.29	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	Sunfish	1,068	3	2.81	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Portage—															
	Deerfield	1,101	16	14.53	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	Edinburg	735	4	5.44	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	Freedom	670	6	8.96	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	Hiram	704	4	5.68	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	Mantua	738	14	18.97	2	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	Nelson	794	5	6.30	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	Ravenna	990	18	18.18	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	Shalersville	912	9	9.87	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	Streetsboro	672	2	2.98	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Preble—															
	Dixon	978	6	6.13	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	Gratis	1,351	14	10.33	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	Harrison	2,218	1	2.25	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	Israel	1,257	14	11.11	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	Jackson	1,257	3	2.39	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	Jefferson	1,257	14	12.43	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	Monroe	1,423	12	8.43	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	Twin	1,479	19	6.76	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Putnam—															
	Jennings	1,465	6	4.10	4	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	Liberty	1,722	8	4.65	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	Monterey	1,342	9	6.71	4	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	Palmer	1,827	21	11.49	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	Perry	1,266	4	2.93	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	Pleasant	1,466	1	.68	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Richland—															
	Blooming Grove	978	11	11.25	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	Butler	763	8	10.46	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	Cass	720	17	23.61	3	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	Jackson	841	1	1.19	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	Monroe	1,224	9	7.35	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	Plymouth	736	2	2.71
	Sandusky	598	6	10.03
	Springfield	1,373	10	7.28
	Worthington	1,258	11	8.74

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Washington—														
Muskingum	1,204	4	3.32	2	1
Salem	1,310	18	13.74	1	2
Warren	1,813	14	7.72	1
Waterford	1,557	17	10.92
Wesley	1,323	11	8.31
Wayne—														
Baughman	2,202	7	3.18	1
Chester	1,618	16	9.71	1
Clinton	985	9	9.14	1	1	1
East Union	1,418	15	10.58
Franklin	1,202	5	4.16
Green	2,090	21	10.06	1	4	1
Paint	1,044	6	5.75	1
Salt Creek	1,045	5	4.78	1	1
Sugar Creek	1,638	7	4.25	1
Wayne	1,717	5	2.91	2	1
Williams—														
Center	1,450	13	8.97
Jefferson	1,213	3	2.46
Mill Creek	1,485	2	1.35
St. Joseph	1,090	8	7.34	1	1
Springfield	1,135	10	8.81	1
Superior	1,095	1	.91	1
Wood—														
Bloom	1,543	1	.65	1
Freedom	1,184	9	7.60	4
Grand Rapids	428	2	4.57
Jackson	1,448	4	2.76
Lake	1,703	2	1.18	1	1
Milton	1,554	20	12.87	4	1	1
Montgomery	1,637	29	17.72	7
Perry	1,290	7	5.43	1
Perrysburg	2,514	37	14.72	8	1	2	1
Plain	1,120	3	2.68	1	1
Washington	868	5	5.76	1
Weston	659	32	48.56	1	1
Wyandot—														
Crawford	970	8	8.25	1	2	1
Salem	1,110	5	4.20	1
Total	853,598	5,745	6.73	401	255	1,156	135	162	86	12	25	52	12	41

ABSTRACT OF THE REPORTS OF DEATHS

Census 1900.	Population.	Total deaths.	Annual rate per 1,000.	Total under one year.	Total under five years and over one year.	Total Zymotic Diseases.	Croup and Diphtheria.	Cholera Infantum.	Cerebro-Spinal Meningitis.	Cholera Morbus.	Diarrheal Diseases.	Dysentery.	Malarial Fever.	Measles.
Cities (62)	1,739,388	27,388	15.75	4,824	1,962	4,810	541	322	143	12	1,080	132	38	81
Villages (350)	422,612	5,155	12.20	470	235	861	113	143	54	9	29	37	18	19
Townships (656) ...	853,598	5,745	6.73	401	255	1,156	125	162	86	12	25	52	12	41
Total	3,015,598	38,288	12.69	5,695	2,452	6,827	789	627	283	33	1,134	221	68	141

AND THEIR CAUSES DURING 1903.

Puerperal Fever.	Scarlet Fever.	Tonsillitis.	Typhoid Fever.	Whooping Cough.	Total Constitutional Diseases.	Cancer.	Phthisis Pulmonalis.	Total Local Diseases.	Apoplexy.	Bright's Disease.	Bronchitis.	Convulsions.	Gastritis and Peritonitis.	Heart Disease.	Meningitis.	Pleurisy.	Pneumonia.	Total Developmental Diseases.	Total Violence.	Premature and Still Births.
27	115	2	1,131	209	4,914	1,083	2,886	12,650	974	1,142	588	696	450	2,291	593	76	2,480	2,555	1,927	2,046
20	35	8	151	26	1,089	220	550	2,241	264	230	53	61	152	576	95	20	364	232	325	343
31	67	10	266	44	1,094	221	543	2,658	317	255	30	77	131	621	58	21	397	180	253	404
78	217	20	1,548	279	7,097	1,524	3,979	17,549	1555	1,627	671	834	733	3,488	746	117	3,241	2,967	2,505	2,793

SUMMARY OF MORTALITY REPORTS.

The total number of deaths reported from all causes—excluding premature and still-births—by the cities, villages and townships represented in the preceding tables was 38,288. The population of the cities, villages and townships represented (Census 1900) was 3,015,598, which is equal to an annual death rate of 12.69 per thousand living population represented.

The deaths in 2,893,586 living population (Census 1900) in 1902, were 35,743, equal to an annual death rate of 12.35 per thousand; while in 1901 the total number of deaths reported in 2,737,504 population was 34,477, equal to a mortality rate of 12.59 per thousand.

DEATHS OF CHILDREN UNDER FIVE YEARS OF AGE.

The number of deaths reported of children under five years of age (premature and still-born excluded) was 8,147, which is equal to 21.3 per cent. of the deaths from all causes, and a death rate of 2.7 per thousand population represented. The death rate of children under five the preceding year was 2.7 per thousand population represented.

ZYMOTIC DISEASES.

The total number of deaths reported from zymotic diseases was 6,827, which is equal to 17.8 per cent. of the deaths reported from all causes, and an annual rate of 2.2 per thousand represented.

The number of deaths reported the preceding year from zymotic diseases was 6,333, equal to a death rate of 2.2 per thousand population represented.

CROUP AND DIPHTHERIA.

The total number of deaths reported from croup and diphtheria was 789, which is equal to 2.1 per cent. of the deaths reported from all causes, and a death rate of .26 per thousand of the population represented.

The number of deaths reported the preceding year from these causes was 754, equal to a mortality rate of .26 per thousand of the population represented.

CHOLERA INFANTUM, CHOLERA MORBUS AND DIARRHOEA.

The total number of deaths reported from cholera infantum, cholera morbus and diarrhoea was 1,794, which is equal to 4.7 per cent. of the deaths reported from all causes, and a mortality rate of .59 per thousand population represented.

The number of deaths reported the preceding year from these causes was 1,748 which is equal to a mortality rate of .60 per thousand of the population represented.

MEASLES, SCARLET FEVER AND WHOOPING COUGH.

The total number of deaths reported from measles, scarlet fever and whooping cough was 637, which is equal to 1.7 per cent. of the number of deaths reported from all causes, and a mortality rate of .21 per thousand of the population represented.

The total number of deaths reported from these diseases during the preceding year was 621, equal to a mortality rate of .22 per thousand population represented.

TYPHOID FEVER.

The total number of deaths reported from typhoid fever was 1,548, which is equal to 4.04 per cent. of the total number reported from all causes, and a mortality rate of .51 per thousand population represented.

The number of deaths reported from this cause the preceding year was 1,253, equal to a mortality rate of .44 per thousand population represented.

CONSTITUTIONAL DISEASES.

The total number of deaths reported from constitutional diseases was 7,097, which is equal to 18.5 per cent. of the deaths from all causes, and a mortality rate of 2.3 per thousand population represented.

The number of deaths reported from constitutional diseases the preceding year was 6,591, equal to a mortality rate of 2.3 per thousand population represented.

CANCER.

The total number of deaths reported from cancer was 1,524, which is equal to 3.9 per cent. of the deaths reported from all causes, and a mortality rate of .51 per thousand population represented.

The number of deaths reported from this cause the preceding year was 1,376, equal to a mortality rate of .47 per thousand population represented.

CONSUMPTION.

The total number of deaths reported from consumption was 3,979, which is equal to 10.4 per cent. of the deaths reported from all causes, and a mortality rate of 1.3 per thousand population represented.

The total number of deaths reported from this cause the preceding year was 3,635, equal to a mortality rate of 1.26 per thousand population represented.

LOCAL DISEASES.

The total number of deaths reported from all local diseases was 17,549, which is equal to 45.8 per cent. of the deaths reported from all causes, and a mortality rate of 5.8 per thousand population represented.

The number of deaths reported from all local diseases the preceding year was 16,302, equal to a mortality rate of 5.6 per thousand population represented.

BRONCHITIS, PLEURISY AND PNEUMONIA.

The total number of deaths reported from bronchitis, pleurisy and pneumonia was 4,029, which is equal to 10.5 per cent. of deaths reported from all causes, and a mortality rate of 1.3 per thousand population represented.

In the preceding year there were 3,919 deaths reported from these causes, equal to a mortality rate of 1.4 per thousand population represented.

CONVULSIONS AND MENINGITIS.

The total number of deaths reported from convulsions and meningitis was 1,580, which is equal to 4.1 per cent. of the deaths reported from all causes, and a mortality rate of .52 per thousand population represented.

The number of deaths reported from these diseases the preceding year was 1,612, equal to a mortality rate of .56 per thousand population represented.

DEVELOPMENTAL DISEASES.

The total number of deaths from developmental diseases reported (excluding premature and still-births) was 2,967, which is equal to 7.7 per cent. of the deaths reported from all causes, and a mortality rate of .98 per thousand population represented.

During the preceding year there were 2,616 deaths reported from developmental diseases, equal to a mortality rate of .9 per thousand population represented.

VIOLENCE.

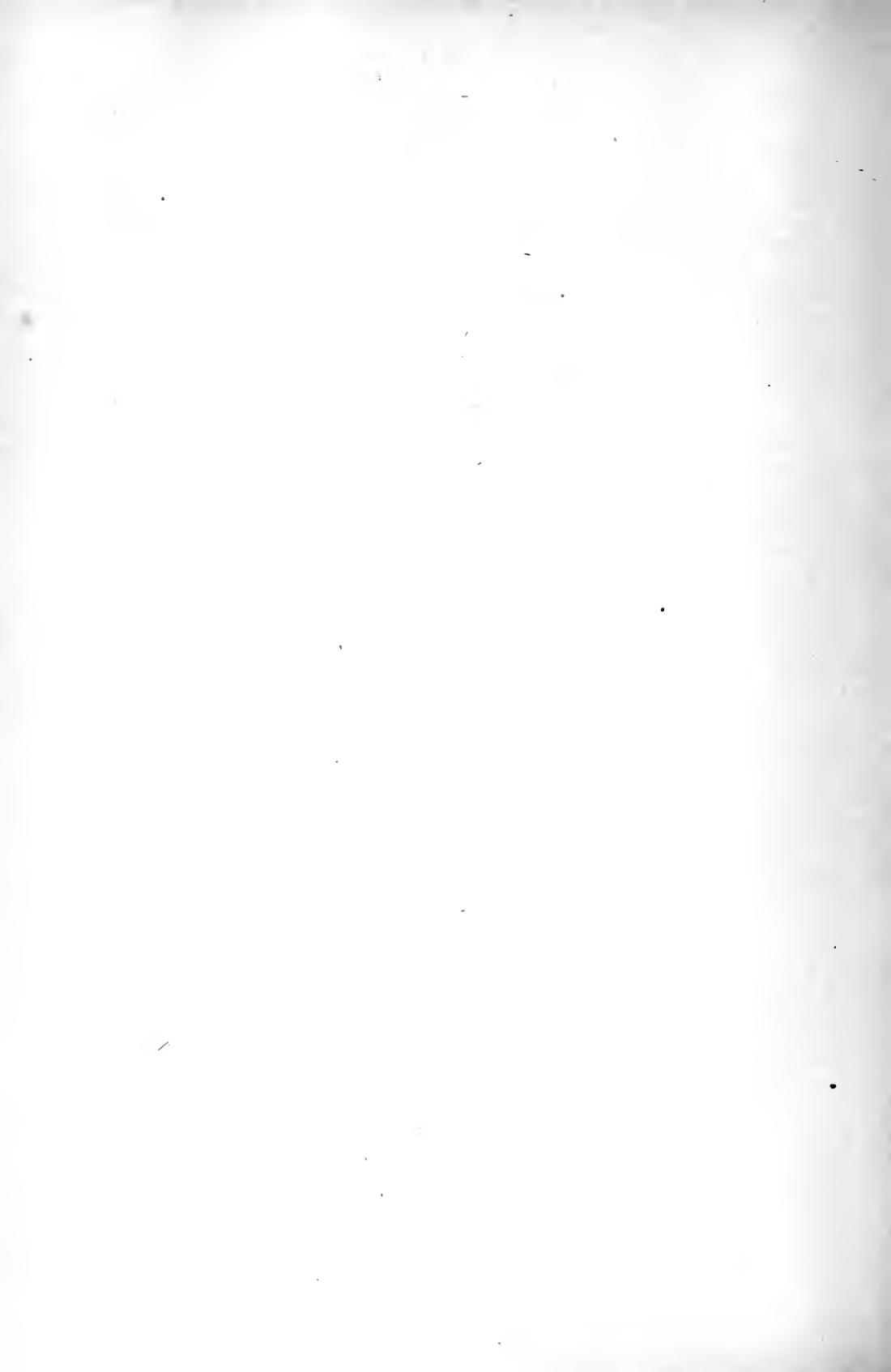
The total number of deaths reported from violence was 2,505, which is equal to 6.5 per cent. of the deaths reported from all causes, and a mortality rate of .83 per thousand population represented.

During the preceding year there were 2,125 deaths reported from violence, equal to a mortality rate of .73 per thousand population represented.

PREMATURE AND STILL-BIRTHS.

The total number of premature and still-births reported was 2,793, which is equal to 7.3 per cent. of the deaths reported from all causes, and a rate of .92 per thousand population represented.

During the preceding year there were 2,594 premature and still-births reported, equal to a rate of .89 per thousand population represented.



APPENDIX

REPORT

OF AN

EXAMINATION

OF

SEWAGE PURIFICATION PLANTS

IN OHIO

OHIO STATE BOARD OF HEALTH

ENGINEERING DEPARTMENT.

COLUMBUS, OHIO, FEBRUARY, 1904.

Dr. C. O. Probst, Secretary of State Board of Health:

DEAR SIR:—I herewith submit a report upon sewage purification works in Ohio. The information herein presented was collected both by the late engineer of the Board, Mr. B. H. Flynn, and by your present engineer. The chemical analyses herein quoted have been made at the laboratory under the direction of the chemist, Mr. E. G. Horton.

It has not been possible to make a thorough study of any of the plants, as this would involve frequent and continued chemical examinations, measurements of flow of sewage and inspections of conditions, at a cost greater than the annual appropriation will allow.

Respectfully submitted,

R. WINTHROP PRATT,
Engineer.

SEWAGE PURIFICATION WORKS IN OHIO.

This report is based upon information obtained by a number of inspections of the sewage purification works in operation at various cities, villages and institutions in this State, together with such facts relating to their cost, construction and operation as were available from the officials in charge and from the constructing engineers. It is not intended to present such indisputable results as would be obtained from frequent examinations of amount and composition of sewage and effluent under various conditions and at different seasons of the year. The samples for chemical analysis have generally been collected by the officials in charge, who were given both verbal and written instructions as to the manner of collection. These men have not always followed directions and moreover have sometimes allowed samples to stand for some time before shipping to the laboratory. All information, however, furnished by those in charge has been approximately verified by inspection or by other means before being quoted.

This report, then, furnishes a good description of each plant at the times of examination and is therefore of value in showing their possible conditions and also in enabling those in charge, in some cases, to see where the methods of operation could be improved.

METHODS OF PURIFICATION.

The following are the principal methods of sewage purification now used in this country and in Europe.

Intermittent sand filtration.—Level beds of sand or gravel or other fine porous material, one acre or less in area and three to five feet in depth, are prepared either with local material or material hauled from a distance. The beds are usually underdrained. The sewage is then applied to these beds intermittently or in "doses," thus allowing the air to freely penetrate the material, between applications, and nourish the "nitrifying bacteria," which live in the sand and purify the sewage as it passes through. The amount of sewage which one acre can purify varies from 25,000 to 200,000 or more gallons per day, according to the size of filtering material and the character and age of the sewage.

Broad irrigation is similar in principle to intermittent filtration except that the natural soil instead of prepared beds is used: the sewage being distributed in ditches from which it ever overflows and spreads over the ground. Underdrains may or may not be used. Crops are usually

grown on broad irrigation fields. The amount of sewage which can be disposed of in this way is not more than 10,000 to 15,000 gallons per acre daily, depending upon the porosity of the soil.

Chemical precipitation, septic tanks and strainers of coarse material are all methods for obtaining partial purification and are often used as preliminary processes to sand filtration and other treatment.

With chemical precipitation, lime or other chemicals is introduced for the purpose of combining with the organic matter and precipitating it out as sludge as the sewage remains at rest in a "precipitation" tank. The sludge is then drawn from the bottom of the tanks and is either pressed into cakes and burned, is used as fertilizer, or is pumped out onto the neighboring land. The resulting effluent usually is freed of fifty to sixty per cent. of the organic matter in the sewage. This method is generally expensive and the sludge is difficult to dispose of.

In a properly operated septic tank, in addition to sedimentation, the sewage is subjected to the action of anærobic bacteria or is allowed to ferment, by which action portion of the organic solid matter is liquefied or changed into gaseous forms, so that the resulting effluent contains less organic matter to be purified by subsequent filtration or dilution. Furthermore, the solid matter which settles to the bottom of the tank is gradually eaten up by the bacteria, so that usually no great accumulation of sludge occurs.

Strainers of coke, coal, slag, etc., one or two feet in depth, have been experimented with as a means of straining out the largest suspended matter in sewage, but these are not much used in practice. The frequent cleaning or renewing of the material makes this method expensive.

The contact bed.—This is a filter composed of coarse material, such as coke, coal, cinders, slag, broken stone, etc., the bottom and sides of which are impervious and the outlet from which is kept closed for certain periods so that the sewage, after it fills the filter, is held in contact with the coarse material and the bacteria dwelling thereon, and is thus purified. It is not expected that the effluent from a contact filter will be entirely without suspended matter or color or that it will be as highly purified as that from a sand filter; but very fair results can be obtained when applying a comparatively large amount of sewage to a small area of filter. The septic tank is generally used as a preliminary to this method. The open space in a contact bed is in time more or less filled with a bacterial growth and also with inorganic substances, thus decreasing the capacity more or less.

Continuous or intermittent-continuous filters.—These are filters of coarse material six or more feet in depth, to which the sewage, after septic or other treatment, is applied continuously, usually in thin streams or sprays at rapid rates. The filters are allowed at certain times to rest and become thoroughly aerated. Though in use in England, there are few, if any, in use in this country, and it is probable that our severe winters would seriously interfere with their operation.

OHIO CONDITIONS.

Sewage purification in Ohio, as elsewhere in this country, is of comparatively recent date. The first plant built in the State was the chemical precipitation plant at Canton in 1893. In 1898 there were seven plants in use by cities, villages and institutions, and in 1903 there were twenty six, while eighteen more were being planned or constructed. The geological conditions in Ohio are such that strata of sand or gravel suitably located for intermittent filtration are rarely found. This method therefore, although it has proven in the eastern states to be the simplest and most reliable, cannot generally be used economically in this State. As for broad irrigation, the price of land is too high in localities within reasonable distance from the centers of population, and moreover most farm land is so moist during a large part of the year that its capacity for absorbing sewage would be very small. City officials and engineers have therefore used those systems which require a minimum area of filtering material. Chemical precipitation works were built at first, but for the last five or six years since the subject of the septic tank and high rate filters has been so much agitated, the practice has largely been to construct septic tanks supplemented by coke, cinder or sand filters.

There are now in use ten septic tanks, while plans for fourteen more have been made. The present tanks have been in operation from one to five years. As sludge destroyers they have been fairly successful, but in a few cases offensive odors are created and in some the effluent from the tank is probably not in the best possible state for subsequent oxidation in the filters. As far as can be learned, the tanks have continued in use from one to two years without decreasing in capacity more than twenty-five per cent. The scum formed at the surface varies from nothing to one foot in thickness. Both surface and bottom accumulation appear to remain fairly constant after reaching a certain volume; but a change in the composition of the sewage or in other conditions may cause a rapid increase in the deposits.

There are widely varying degrees of success in the use of the septic tank, and this emphasizes the fact that not only should all conditions be carefully studied and be made as favorable as possible before a tank is designed but that after the tank is in use it should be carefully watched and tested in order to determine the most efficient mode of operation. The conditions most conducive to success are, even composition of the sewage, even and quiet flow through the tank, even temperature and proper septic period. The first is attained by a system of sewers from which ground water, surface water and manufacturing wastes are excluded; the second by properly designing inlet and outlet; the third by covering the tank, at the same time obtaining proper ventilation for it, and the fourth by making the tank adjustable so that by trial and possibly by chemical analyses the capacity of the tank giving the best effluent, both as regards

suspended matter and capacity for future oxidation, may be determined.

The contact bed is used at five places, at four of which it is provided with automatic regulating apparatus. In one of these cases where there is proper operation, the results are very favorable. In the other cases there is more or less doubt as to the efficiency of the beds.

Although the State Board of Health has approved the plans of nearly all the plants in use, it has had no further control over them. The principal cause of their failure lies in poor operation, rather than in poor design, and it is unfortunate that so many municipal authorities seem to think that the cost of a sewage purification works ends with the payment for its construction.

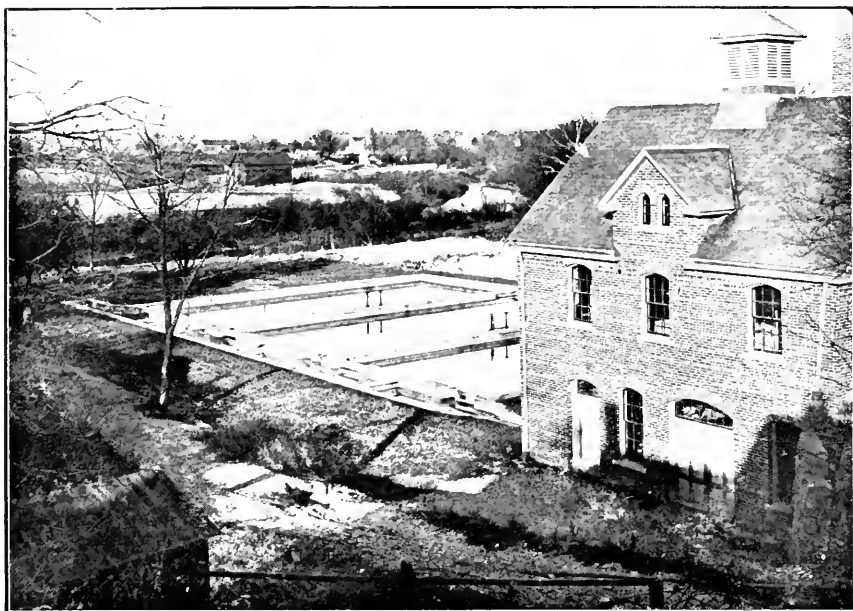
This idea is due to several causes: First, the constructing engineer on finishing his work receives his pay and then leaves the plant entirely in unskilled hands. Some cities have lately, however, made arrangements to retain the constructing engineer for a certain period to insure the proper starting of the plant.

Second. A plant is often installed as the result of a law-suit and the chief object is to spend as little money as possible either for construction or maintenance.

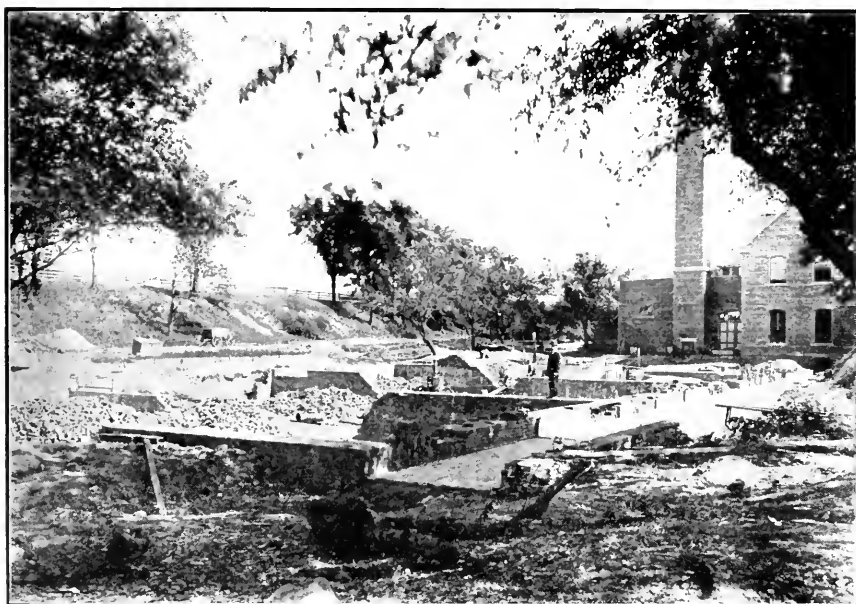
Third. The idea of a sewage purification works in the minds of some people causes a sense of repulsion which destroys all interest in obtaining proper operation.

Fourth. It is not fully realized that the character of the sewage and other conditions are constantly liable to change and that success at one time does not mean success at another unless the most intelligent and constant care is used.

Fifth. The idea that automatic regulating apparatus can be left entirely without supervision. No apparatus has yet been installed which does not require more or less frequent inspection by some one who thoroughly understands it.



Alliance. General View of Works.



Alliance. General View During Construction of Tanks.

ALLIANCE.

This city has a population of 9,500, and is located on the Mahoning River which at this point has a watershed of about 73 square miles and a dry weather flow of 3 cubic feet per second. Waterworks were installed in 1883, the supply being taken from the river; the average daily consumption is 1,600,000 gallons per day or 260 per consumer. There are several factories which use the public supply.

The first domestic sewers were built in 1893, though there were storm sewers previous to this which received sewage. These sewers discharged into the river and into Reck Run, causing so much nuisance that when it was proposed in 1894 to construct a sanitary system, an injunction was secured restraining the city from discharging sewage into the river. Consequently disposal works were built and put in operation in 1896; the method being chemical precipitation.

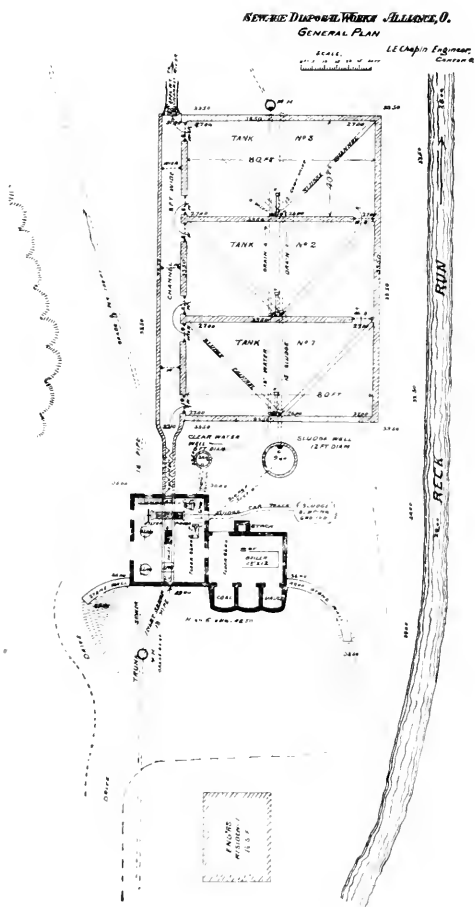
There are at present fourteen and a half miles of sewers, built on the separate plan and having 844 connections. There are only a few hundred feet of sub-drains beneath these sewers; but it is said that very little leakage occurs. The estimated number of people using the sewers is 4,000 and the average daily flow is 500,000 gallons.

There are two large iron working factories connected and also the gas works which empties some of its waste products into the sewers.

The works are located at the junction of Reck Run and the Mahoning River in the northerly part of the city at the edge of the built up portion. They consist of a two-story brick building, approximately 60 by 30 feet, the upper story of which contains chemical mixing apparatus and is accessible from the street by means of a driveway; which avoids the necessity of elevating the materials. On the lower floor is a 40 horsepower boiler which furnishes steam for operating the mixing tanks and pumps.

Under the floor of the engine room is a 3 foot channel, through which passes the flow from the city's main sewer. Into this channel a solution of lime water flows by gravity from an iron tank; the solution being well distributed across the stream of sewage by means of a plate. Provision is made for the introduction of alum-water also, but the use of this has been discontinued.

After receiving the lime the sewage flows for a distance of 40 to 50 feet to the precipitation tanks, three in number, each of which is 40 by 80 by 6 feet and has a capacity of 140,000 gallons. The total tank capacity is about 82 per cent. of the daily flow. At the entrance of each is a screen having an open space of about one inch, which retains the heavier sewage matter. The flow through the tank is continuous except when interrupted for cleaning, which occurs twice a week for the first two tanks and once a week for the last tank. The application of the lime is not always continuous.



The tanks are of brick with stone copings and so arranged that by means of stop planks any one of the three may be cut out of service when it is desired to drain out the sludge. This feature of the operation is accomplished as follows: All flow of sewage is excluded from the tank and the sewage already in the tank is allowed to settle for three or four hours. The clarified sewage is then drawn through a floating outlet into an iron pipe leading to the river, or if the stage of water in the river makes this impracticable, to a clear water well from which it is raised by a centrifugal pump and discharged into the creek. The heavy sewage and sludge at the bottom flows by gravity into the sludge well from which it is pumped to the sludge press, located in the engine room directly over the main sewage channel.

From the filter press a narrow gage track leads out to the bank of the creek where the pressed sludge is dumped. About two tons is thus disposed of daily, and the quantity deposited here is increasing rapidly, as the farmers take only a portion of it away for fertilizing purposes; this constitutes the only nuisance of the plant.

The nearest house to the plant is that of the superintendent, about 100 feet distant. The L. E., A. & W. R. R. shops are 600 feet away.

The effluent is slightly milky and has a musty odor when it enters the river and the gas plant refuse is often recognized in it. Complaints have been made at times of extreme low water, but the cause for such is said to have been due to the pollution from the storm sewers which discharge into Reck Run and which still receive some sewage, rather than to the effluent from the disposal plant.*

The following individual samples were collected and analyzed in 1897, in connection with the examination by the State Board of Health of sources of public water supplies:

*When visited in September, 1904, the plant was doing very poor work; very little purification was being effected in the sewage and numerous complaints were heard on account of the polluted condition of the stream and on account of odors from the plant itself. About 200 more connections had been made with the sewers since 1903. Eighteen bushels of lime were being used daily. The superintendent states that the wastes from the gas works cause much trouble in the tanks and hinder the clarification of the sewage to a certain extent. In pressing the sludge these wastes also cause much trouble by adhering to the press cloth.

CHEMICAL EXAMINATION OF SEWAGE

(Parts per Million.)

No. of Sample.	Description of Sample.	Date and Hour of Collection.	Color.	Turbidity.	Sediment.	Odor.	Oxygen Required.
23	Sewage.....	June 19, 1897.....	3.0	slight	very marked	offensive	19.2
49	Sewage.....	July 24, 1897.....	3.0	none	marked	offensive	9.8
73	Sewage.....	Sept. 2, 1897.....	2.0	slight	marked	oily & sl. off.	8.3
102	Sewage.....	Oct. 2, 1897.....	3.0	distinct	marked	sl. off.	8.5
106	Sewage.....	Oct. 29, 1897.....	2.5	trace	marked	oily	10.0
	Average.....						11.2
24	Effluent.....	June 19, 1897.....	2.5	slight	slight	earthy	6.9
50	Effluent.....	July 24, 1897.....	2.0	none	marked	faint musty	6.5
74	Effluent.....	Sept. 2, 1897.....	2.0	very slight	marked	sl. gre'sy musty	7.3
103	Effluent.....	Oct. 2, 1897.....	2.5	slight	slight	faint musty	7.2
107	Effluent.....	Oct. 29, 1897.....	2.5	very slight	slight	musty	7.7
	Average						7.1
3450	Sewage—At end of main sewer.....	Composite Jan. 19, '04, 7-11 a.m.....	40 off	175	dec.	sewage	17.37
3452	Sewage—At end of main sewer.....	Composite Jan. 19, '04, 12 m.-4:30 p.m. ...	30	700	much	4 sew'ge pec.	15.48
3451	Effluent from works...	Composite Jan. 19, '04, 7-11 a.m.....	30	15	s.	3 musty	6.83
3453	Effluent from works...	Composite Jan. 19, '04, 12 m.-4:30 p.m. ...	40 off	25	s.	3 musty	6.46

NOTE.—Sample No. 3450 was collected at a point just above the entrance of the line, while No. 3452 was collected just below the entrance of the line. Samples were analyzed three days after collection.

AND EFFLUENT FROM ALLIANCE.

(Parts per Million.)

Nitrogen as				Chlorine.	Alkalinity.	Incrusting Constituents.	Solids.		Loss on Igni- tion.	
Alb. Ammonia.	Free Ammonia.	Nitrites.	Nitrates.				Total.	Suspended.	Total.	Suspended.
2.640	10.592	0.019	0	30.0	212	x	490		110	
0.864	1.636	0.185	0.44	25.5	158	128	475		80	
0.708	0.828	0.150	0.61	16.5	178	94	490		85	
1.970	3.180	none	0	18.5	200	94	525		100	
1.380	2.370	0.300	0.09	15.0	186	100	490		100	
1.512	3.721	0.131	0.230	21.1	187	104	494		95	
0.748	3.520	0.401	none	21.0	146	120	395		65	
0.600	1.480	0.332	0.36	32.5	134	140	490		90	
0.748	1.608	0.225	0.53	22.3	178	110	480		95	
0.870	2.900	none	none	19.0	150	84	440		65	
0.950	2.350	0.015	none	17.0	142	102	420		85	
0.783	2.372	0.194	0.18	22.3	150	111	445		80	
3.110	8.360	tr.	none	18.4	304	66	556	61	92	.....
2.010	2.720	tr.	tr.	34.6	357	106	1,290	712	434	.....
.680	3.900	.100	tr.	11.6	229	106	423	3	120	.....
1.550	5.670	.024	tr.	15.5	178	104	449	45	152	.....

The cost of construction up to 1897 was about \$22,200. In operating the plant fourteen bushels, or 980 pounds, of lime are used daily, at a cost of 15 cents a bushel, or a daily cost of \$2.10. The operating expenses for 1903 were, salaries of two men \$960.00, fuel \$367.30, lime \$766.50, making a total of \$2,093.80.

TABLE SHOWING COST OF OPERATION IN DIFFERENT YEARS.

Year.	1898.	1899.	1900.	1903.
Connections	250	309	356	844
Estimated population connected ..	1,300	1,500	1,700	4,000
Total cost of operation.....	\$1,611 75	\$1,650 00	\$1,740 70	\$2,093 80
Yearly cost per person connected..	1 24	1 10	1 02	0 52
Pounds of lime used yearly per person connected	101	105	105	95
Yearly cost of lime per person connected	\$0 20	\$0 21	\$0 21	\$0 19

This shows that the cost of operation per person connected decreases as the amount of sewage increases, although the lime used per person remains fairly constant.

FAIRMOUNT CHILDREN'S HOME AT ALLIANCE.

This Home has a population of 175, and is located four miles south of the city of Alliance, and drains naturally into a ditch or run which enters the Mahoning River above the intake of the Alliance waterworks.

Two systems of sewage disposal have already been built at this institution. The first, a sub-surface disposal system built in 1896, failed after a period of two years on account of the filling up of the distributing pipes with solid matter and the inability of the ground to absorb the sewage.

The second system, built in 1900, consisted of a circular tank, aerating steps, contact beds and also filter beds of gravel and coke. The sewage entered the tank in such a manner as to cause a rotary motion of the contents and thus increase sedimentation. The tank held one day's flow and considerable septic action is said to have taken place in it. The effluent from the tank was very foul and on account of the close proximity of the plant to the buildings of the Home a very offensive nuisance was caused. Moreover, the contact beds and filters, partially on account of improper operation, effected little purification, and putrefying sewage was left on these beds and filters to create further odors. The plant was abandoned in the summer of 1903, when the present one was built.

The present works are located 600 to 800 feet from the buildings, and consist of four sand filters each 50 feet square, having a total area of .23 acres.

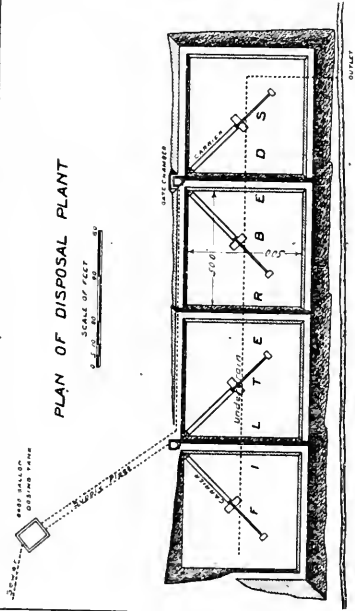
The flow of sewage is about 15,000 gallons per day and is fairly dilute in composition; the great majority of the occupants of the home are young children and all closets are provided with automatic flushing devices which use a large amount of water.

After passing through a screen having three-fourths-inch open spaces and located in a manhole near the boiler house, the sewage is collected in a dosing tank having a capacity of 2,400 gallons. At each discharge this covers a bed to a depth of about 1.5 inches. Two dosing pipes lead from this tank and terminate in gate chambers, each of which controls the flow upon two beds. By means of a double or alternate acting siphon in the flush tank, the doses can thus be alternated between two beds, while the other two are resting.

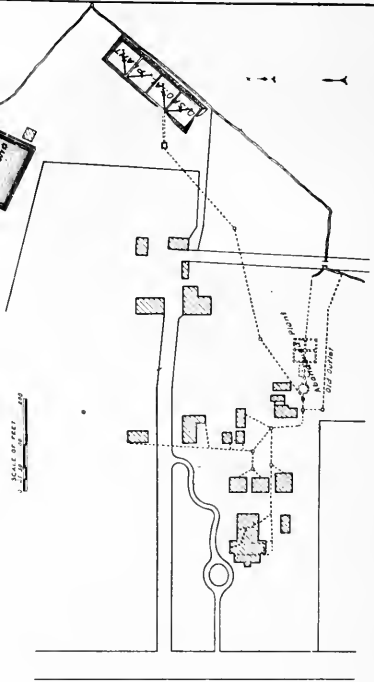
The depth of filtering material is 4.3 feet over the underdrain and decreases to 3.7 feet at the sides of the beds. One main underdrain, 4 inches to 6 inches in diameter, passes through the center of all four beds, and is laid on a grade sufficient to prevent the draining of one bed from affecting the draining of another. The underdrains and also the entire bottom of the beds are covered with a layer 6 inches or less in thickness, of broken

PLAN OF
SEWAGE DISPOSAL PLANT
FAIRMOUNT CHILDRENS HOME
ALLIANCE, OHIO

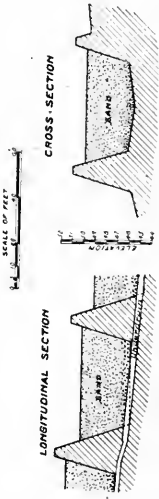
1903
Snow and Barbour, Engineers
Boston and Columbus



GENERAL PLAN



SECTIONS THROUGH FILTER BEDS



stone and gravel, while the main body of the filter consists of an excellent quality of clean sharp sand taken from the bed of the Mahoning River at a point four and one-half miles distant. The effective size of this sand is about .20 mm. and the uniformity coefficient 1.8.

The plant was put in commission a few weeks before cold weather, but immediately produced a very clear, sparkling and odorless effluent, and continued to do so until the beds became partially frozen, as they were not furrowed owing to the sudden appearance of the freezing weather. Until freezing, the beds quickly absorbed all sewage that was discharged upon them, and as the sewage was comparatively fresh, no odors whatever were created.

The cost of the plant was about \$6,000.00, the greater part of which was spent for the filtering material.

The cost of maintenance amounts to the price of not more than one hour's work each day.

CANTON.

The city of Canton, having a population of 32,500, is located on Nimishillen Creek, a tributary of the Muskingum River. The creek has here a watershed of about 100 square miles and a dry weather flow of 3 to 4 cubic feet per second, judging from the results of gaging the flow of the Mahoning River at Alliance.

The public water supply was introduced in 1869. The average daily consumption is 2,828,000 gallons, and the consumption per consumer 112 gallons.

There were several storm sewers built at that time which are still in use and receive some sewage. The sewage of two thousand employes of two watch factories and also the manufacturing refuse from rolling mills and galvanizing works are discharged directly into the creek or its branches near the center of the city.

There are now 33.74 miles of sanitary sewers, which have 2,144 connections and are used by about 1,100 people. The sewers receive domestic sewage only and are provided with about 75 flush tanks, each using 772 gallons of water per day, or a total of 58,000 gallons. The total flow at the works is from 2,000,000 to 2,500,000 gallons per day, a very large part of which is ground water collected by the main 24-inch trunk sewer below the last sewer connection. Five thousand feet of the sewers are under-drained. By actual measurement in 1893 the flow per person connected was 100 gallons per day. This quantity is now over 200 gallons. About 50 per cent. of the present total flow is therefore ground water.

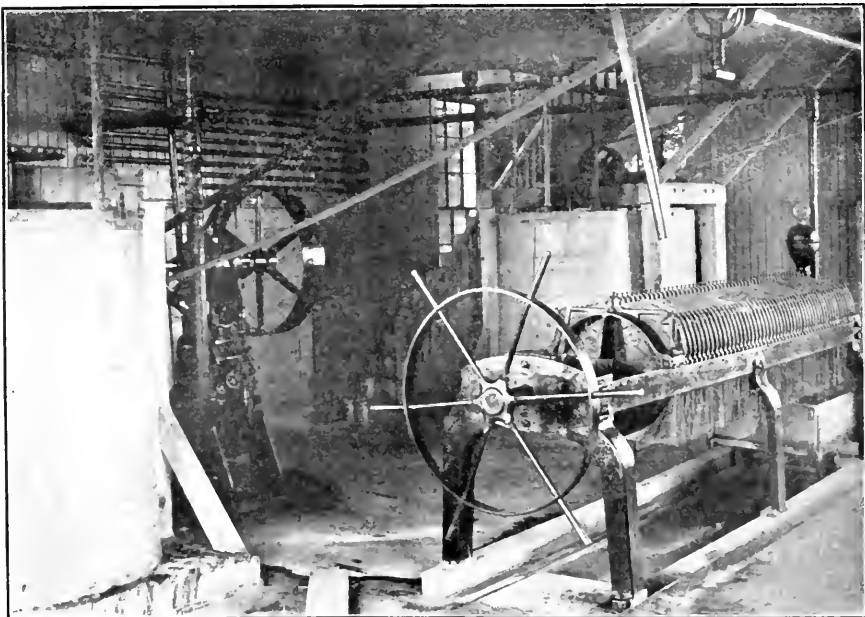
The city, in 1888, on beginning to construct its sanitary sewers, was forced by land owners on the stream below to provide for purification of its sewage. It accordingly purchased a 28 acre tract, having a clayey soil and bordering on the creek, about two miles south of the center of the city. Chemical precipitation works were completed in 1893.

The plant consists of a two-story brick building, approximately 35 by 60 feet, on the lower floor of which are located the boiler, pumps and mixer, while the upper floor is used as a store-room for the chemicals. Adjacent to the building are four brick precipitation tanks, each 50 by 100 feet, with a depth of about 5 feet, which may be increased by means of stop planks if desired. With this depth the total capacity of the four tanks is 700,000 gallons, or about one-third the present daily flow. A sludge cistern, 10 feet in diameter and 18 feet deep, is located just outside the boiler room.

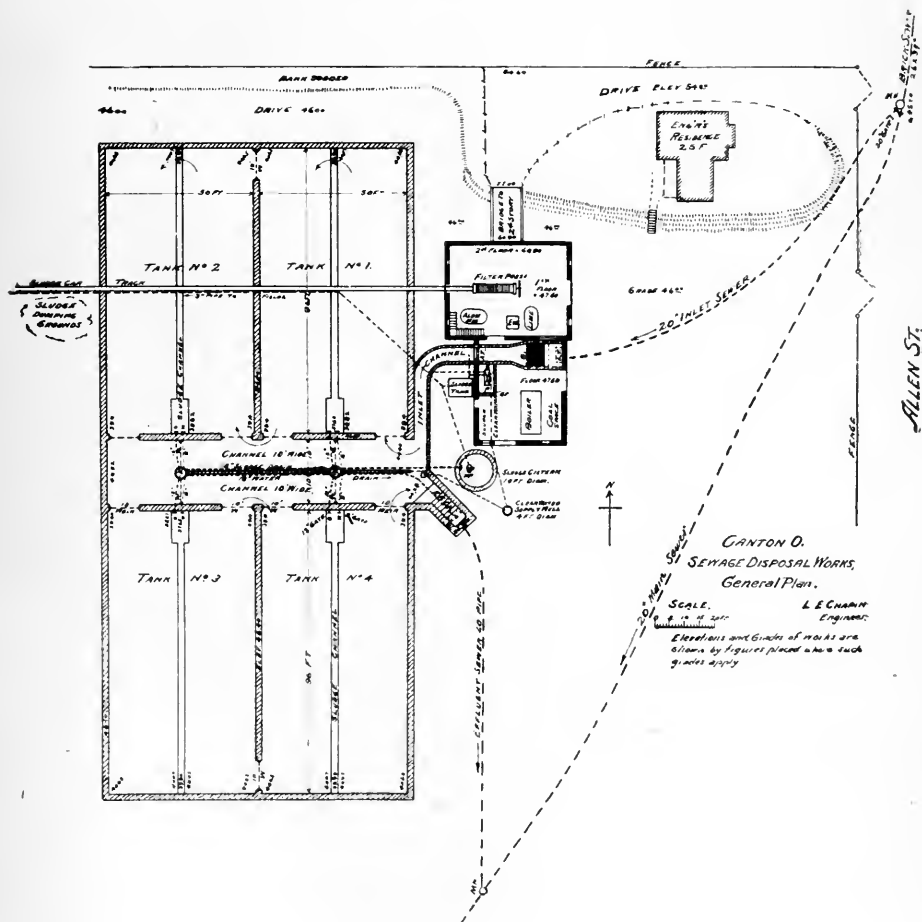
The sewage enters the works by gravity, through a 4-foot inlet channel underneath the floor of the boiler room, where, by means of an iron screen having one inch open spaces, the larger floating matters are taken



Canton. General View of Works.



Canton. Mixing Tanks and Sludge Press.



out and burned under the boiler. Lime water is here introduced in the sewage, which, after flowing about 60 feet, enters the first precipitation tank and from there flows through the remaining three tanks, becoming clearer in each, until it passes over a weir and down a set of aerating steps to an effluent sewer leading to the creek. The flow through the tanks is thus continuous except when interrupted for draining. The first two tanks are drained three times a week and the last two once a week. This is done as follows: The flow is cut off from the tank to be drained and the sewage already in it is allowed to remain at rest for several hours to allow as much matter to settle out as possible. The supernatant water is drawn off through floating outlets to a clear water sewer which is placed beneath the distributing channel and connects with the effluent sewer. The sludge is then allowed to drain into the sludge well, from which it is pumped either to the sludge press or out on the fields.

The walls of the tanks are kept whitewashed and lime is used in the sludge well if necessary to prevent odors. The house of the superintendent is 100 feet away and there is one other about 300 feet distant. Except for these two there are no houses within a long distance. There was no very disagreeable odor about the plant at the time of inspection and the people who live nearest do not consider it a nuisance, although visitors to the plant claim to have found it offensive.

The disposal of the sludge is becoming a serious problem here as in other similar plants. The farmers do not care to haul much of it away. The amount of sludge far exceeds the capacity of the press, so that for the last three years most of it has been pumped directly to the fields where it is plowed under and the land planted with corn, which grows to an enormous size. The land available for this is limited, however, and will become overloaded with sludge. The city garbage disposal works is located about 800 feet away and it may in time become necessary to press the sludge and burn it there. No nuisance is caused by the garbage plant.

The sewage disposal works is provided with apparatus for introducing alum into the sewage, but this has not been used for the last three years on account of the expense caused by the increase in the amount of sewage. As far as the appearance of the effluent is concerned, the lime alone is quite as effective.

During its ten years of operation the plant has been a success in that it has reduced the visible pollution of Nimishillen Creek.

Occasionally a milky discoloration, with slight deposits and odors, occurs within a few hundred feet of the outlet.

The following analyses have been made:

CHEMICAL EXAMINATION OF SEWAGE
(Parts per Million.)

No. of Sample.	Description of Sample.	Date and Hour of Collection.	Color.	Turbidity.	Sediment.	Odor.	Oxygen Required.
.....	*Sewage.....	4 days composite Jan. 14-18, 1896	3.0	very slight	cons.		16.64
.....	*Effluent.....	Same.....	0	0	sl.		6.88
2324	Sewage.....	Composite. July 2, 1902, 8:30 a. m.-5:3 p. m.	70!		cons.	5 sew. oily.	60.99
2331	Sewage.....	Composite. July 2-3, '02, 6 p.m.-6 a.m.	65!		dec.	4 sew.	22.45
2325	Effluent	Composite. July 2, '02, 8:30 a.m.-5:30 p.m.	70!		dec.	3 sew.	20.60
2332	Effluent.....	Composite. July 2-3, '02, 6 p.m.-6 a.m.	65!		dec.	4 sew.	23.76
3434	Sewage.....	Composite. Jan. 18, '04, 7 a.m.-6 p.m.	40	50!	dec.	sew.	35.36
3446	Sewage.....	Composite. Jan. 18-19, '04, 7 p.m.-6 a.m.	20	20	sl.	sew.	11.40
3445	Effluent.....	Composite. Jan. 18, '04, 9 a.m.-7 p.m.	30	45	sl.	sew.	16.88
3441	Effluent.....	Composite. Jan. 18-19, '04, 9 p.m.-7 a.m.	40	70	sl.	sew.	29.64

*Daily flow in 1896, about 1,300,000 gal. 20 bu. lime, 300 lbs. alum per day used Jan. 14-18, 1896.

The cost of construction of the plant was \$31,545.00, of which \$5,000.00 was paid for land.

The annual cost of maintenance, consisting principally of salaries, fuel and chemicals, is about \$3,850.00, divided as follows: salaries of three

AND EFFLUENT FROM CANTON.

(Parts per Million.)

Nitrogen as				Chlorine.	Alkalinity.	Increasing Constituents.	Solids.		Loss on Igni- tion.	
Alb. Ammonia.	Free Ammonia.	Nitrites.	Nitrates.				Total.	Suspended.	Total.	Suspended.
3.260	8.940	none	.090	21.4	.....	.....	493	.....	.....	.....
1.120	6.760	0.060	1.441	20.5	.....	.....	410	.....	.....	.....
6.250	10.250	tr. off	none	39.2	273	34	608	.....	252	.....
1.760	7.400	none	none	32.7	202	0	376	.....	91	.....
2.500	7.950	none	none	32.2	204	34	427	.....	94	.....
2.530	11.650	none	none	37.7	216	12	334	.....	115	.....
4.260	12.100	none	none	29.3	406	.....	653	122	255	83
1.620	4.650	tr.	none	24.0	338	.....	459	8	175	47
1.850	7.260	tr.	none	25.0	348	.....	499	32	160	16
1.820	8.170	.024	none	28.8	341	.....	507	25	173	3

Total solids in Canton water supply (ground water) is about 350 parts per million.

men, two day and one night, \$2,100.00; lime, \$550; fuel, \$600.00; and repairs, etc., \$600.00. The lime costs 12 cents per bushel and about 14 bushels, or 980 pounds, are used every day. The total amount of lime used has, apparently, been decreased rather than increased as the flow of sewage has become greater.

LAKE SHORE AND MICHIGAN SOUTHERN RAILROAD SHOPS AT COLLINWOOD.

The shops of the Lake Shore and Michigan Southern Railroad, occupying several acres of ground, are located well within the built up portion of the village of Collinwood.

Not wishing to pollute a small stream which passes near the shops, nor the shores of Lake Erie one-half mile away, the railroad company installed a sewage purification plant at the time of the completion of the shops in 1902. There are now about 500 employes, the sewage from all of whom is treated.

The sewage is first collected in a circular well 6 feet in diameter. After the depth of the liquid in the well has become about 5 feet, a pump, driven by compressed air and automatically started by means of a float, raises the contents of the well (amounting to about 1,000 gallons) into the septic tanks, a vertical distance of some 15 feet.

The septic tanks are two in number, each 21 feet by 10 feet, 9 inches with a total depth of 9 feet. The depth of the sewage varies from 5.5 to about 8 feet, thus giving a capacity of from 18,000 to 26,000 gallons.

The force-main of the pump leads into a horizontal 12-inch perforated pipe extending across the upper ends of the two tanks, 3.5 feet from the bottom, or 2 feet below the minimum level of the sewage. The sewage is drawn off through the corner of each tank through an opening in a 6-inch pipe. These pipes each lead to a siphon chamber in which the liquid stands at the same level as that in the tank connected with it. Therefore when the sewage rises to a depth of about 8 feet, a siphon operates automatically and discharges all the sewage in both septic tank and siphon chamber which is above a plane, approximately 5.5 feet from the bottom, on to one of the contact beds. In each siphon chamber are two siphons, which act automatically, each one discharging upon its separate bed.

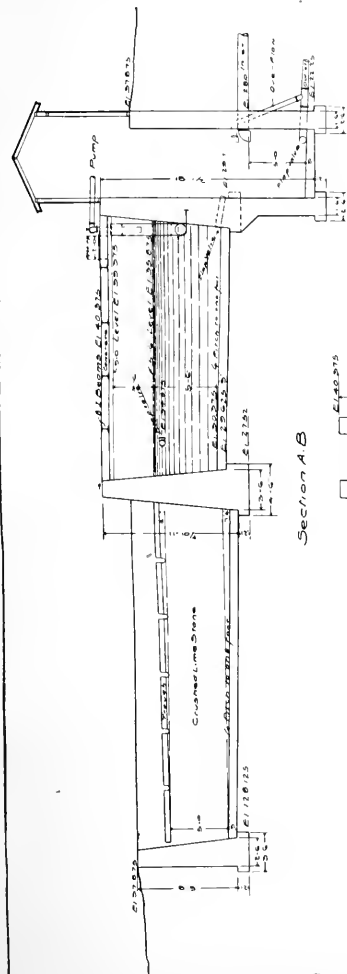
The sludge from the bottom of the septic tank may be drained into the collecting well, which may be drained and cleaned.

There are four contact beds, which consist of concrete basins, each 15 by 29 feet, filled with 5 feet of limestone broken into pieces about 2 inches in diameter. Ample means for the distribution of the sewage over the surface is provided by a system of wooden troughs. Six under-drains, about 6 feet apart, leading into a 12-inch drain, are laid on the bottom of each bed. When a bed becomes filled it is drained automatically through a siphon into the effluent drain leading to the creek.

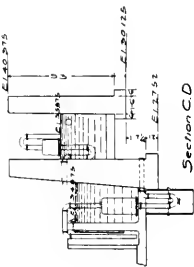
The contact beds are covered with a wooden platform in which trap doors are placed. These doors are left open during a large part of the time, but no odors are said to have been caused by so doing.

From all information obtained it may be said that this plant has been

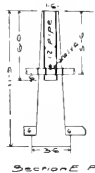




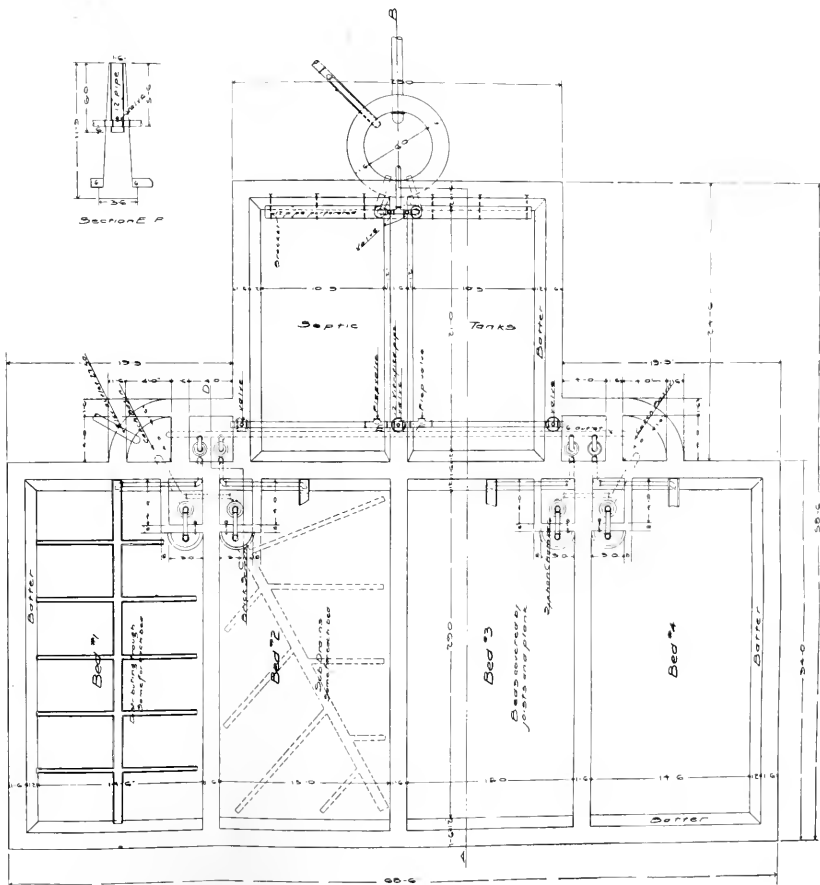
Section A-B



Section C-D



Section E-F



Plan

LS & MSRY
Collinwood, O.
Sewage Disposal Plant

W.C. PARMLEY Consulting Engr.
Cleveland, O.

Scale
Feet

very successful. No objectionable odors are created in spite of the close proximity to the shops and to several dwellings, and no complaints have been heard regarding the pollution of the stream. The operation of the septic tank is unusual in that both the inflow and outflow occur intermittently and irregularly and the level of the sewage is continually changing; the tank being used as a combination septic and flush tank. Judging from the slow accumulation in it, however, the septic action has not been seriously interfered with.

The following analyses show that the effluent was at that time of an inoffensive character and that nitrification had started:

CHEMICAL EXAMINATION OF EFFLUENT FROM L. S. & M. S. R. R. SHOPS—
COLLINWOOD.

(Parts per Million.)

No. of Sample.	Description of Sample.	Date and Hour of Collection.	Color.	Turbidity.	Sediment.	Odor.	Oxygen Required.
3241	Effluent.....	Nov., 1903, 9 a.m.....	40	v. s.	s.	5 musty	7.16
3244	Effluent.....	Nov., 1903, 9 a.m.	40	v. s.	s.	5 musty	11.94

(Parts per Million.)

Nitrogen as				Chlorine.	Alkalinity.	Incrusting Constituents.	Solids.		Loss on Ignition.		No. of Sample.
Alb. Ammonia.	Free Ammonia.	Nitrites.	Nitrates.				Total.	Suspended.	Total.	Suspended.	
.520	3.900	.140	.5	19.4	158	74	358	28	66	9	3241
.820	6.020	.170	.4	18.9	131	67	350	15	59	.....	3244

The cost of the plant was \$6,800.00. The cost of maintenance has been practically nothing; occasional attention having been necessary to keep the pump in good working order.

CLYDE.

Clyde is a village having a population of 2,600, located in Sandusky county, on Raccoon Creek, a small stream nearly dry during most of the year, which flows into Sandusky Bay.

Waterworks were built in 1884 and the average daily consumption is about 125,000 gallons per day, which is 48 gallons per capita, nearly all the inhabitants being supplied with water.

The first sewers were built in 1893. There are now 2.75 miles, all on the combined plan, which includes three-fourths of a mile of a large brick sewer built for land drainage only. There are about one hundred connections with the sewers, all of which are from dwelling houses, except one from a sauerkraut factory, which, though operated only for two or three months in the year, discharges a waste liquor from the pickling vats into the sewers with the effect of befouling them and interfering with purification of the sewage. A gas works discharges some waste materials.

The flow of sewage varies from about 100,000 gallons per day in dryest times to many times that amount during storms or when the ground water is high, at which time the purification works are flooded and overflow through vertical pipes connected with the underdrains. From December to April no attempt is made to use the works, the sewage being discharged directly into the creek.

The works were built in 1898, on account of suits brought against the village by farmers owning the land along the stream below town. They are located about one-half mile northwest of the edge of the built-up part of the village and are within 800 feet of three isolated houses, the nearest of which is 500 feet distant. No nuisance is caused to the occupants of these houses when the works are well cared for. Intermittent sand filtration, without preliminary treatment, is the method adopted.

On the twenty-three acres of land bordering on the creek and owned by the village four acres have been made into filter beds by stripping off the top soil, building division embankments with it and underdraining the sub-soil, which consists of a fine sand containing some clay. There are eight beds, averaging one-half acre in extent. The first system of underdrains consisted of continuous lines of vitrified pipe, some 20 feet apart, extending through each row of beds at a depth of about three feet, cinders being packed close to each line. This arrangement was later changed, however, and at present each bed is drained independently and more satisfactorily by two lines of 8-inch pipe into which enter, at right angles, lines of 4-inch pipe 16 feet apart. This second system is of porous agricultural tile with butted joints. Owing to the fineness of the material

in which they are laid the latter system is said to collect much less sand than did the first system of vitrified pipe with open joints. It would seem, however, that the vitrified pipe, with bell and spigot joints, would be much more likely to remain in place.

The filtering material is a very fine sand containing some clay. Mechanical analysis shows it has an effective size of about .03 mm. and a uniformity coefficient of about 6. It contains much dust.

The sewage is delivered to the different beds by means of carriers laid in the embankments and provided with gate chambers where necessary. At the outlet of the carriers on the surface of each bed is a shallow box 5 by 10 by 1 foot, for the purpose of retaining as much solid matter as possible as the sewage passes through it.

There are no distributing chambers of any kind over the surface of the beds.

During the introduction of sauerkraut factory wastes into the sewers the sand surfaces clog quickly and the odor from the carriers and gate chambers as well as from the beds, due to decomposing kraut waste and sewage mixed, is much more offensive than the odor from the sewage alone would be. The effluent discharged when the plant was receiving this kraut waste was very foul, but this was probably not all due to the character of this waste, but partly to the fact that the beds were not in a condition to allow proper aeration before the time that the kraut factory began its season's work. This waste is discharged into the sewers, not continuously, but in large quantities, at regular intervals during the day, so that a mixture with the ordinary sewage, before reaching the filtration area, is impossible. The analysis of this waste, given later, shows its offensive character.

Four or five inspections have been made of the works since their construction, and at no time have they been working satisfactorily, even before receiving kraut waste. The effluent on these inspections was found to be fairly clear, but to contain a strong odor and to leave a foul deposit, consisting in part of gas works refuse, as it flowed over the banks a short distance to the creek. The sand surfaces were overgrown with weeds, flooded, and coated with dry sludge.

The reason of this failure is lack of sufficient care in keeping the beds clean. One man is said to spend from three to four hours a day in directing the sewage from one bed to another, in cleaning out deposits in gate chambers and settling boxes and in scraping the surfaces of the beds; all solid matter thus collected being thrown out in heaps by the sides of the beds. A thorough scraping of the solid matter from each bed does not occur, however, more than once or twice during each season's operation. With a coarser filtering material this might be frequent enough, but with the fineness and clayey nature of the material at Clyde each bed should be scraped every two or three weeks. Under present conditions each bed after receiving sewage remains flooded for several

days, except when recently cleaned. This defeats the purpose of the nitrifying bacteria in the beds by cutting off their air supply. To obtain best results after each dose the sewage should drain off within a few hours and then the beds should be rested for a day to allow the air to pass through. The overdosing of the beds in times of rain is decidedly harmful to their efficiency.

It is said that the average amount of kraut juice discharged into the sewers during the season is 2,000 to 3,000 gallons per day, though the amount may reach 8,000 to 9,000 gallons per day.

The following are analyses of samples of kraut juice and of sewage before receiving this waste:

CHEMICAL EXAMINATION OF KRAUT JUICE AND SEWAGE FROM CLYDE.
(Parts per Million.)

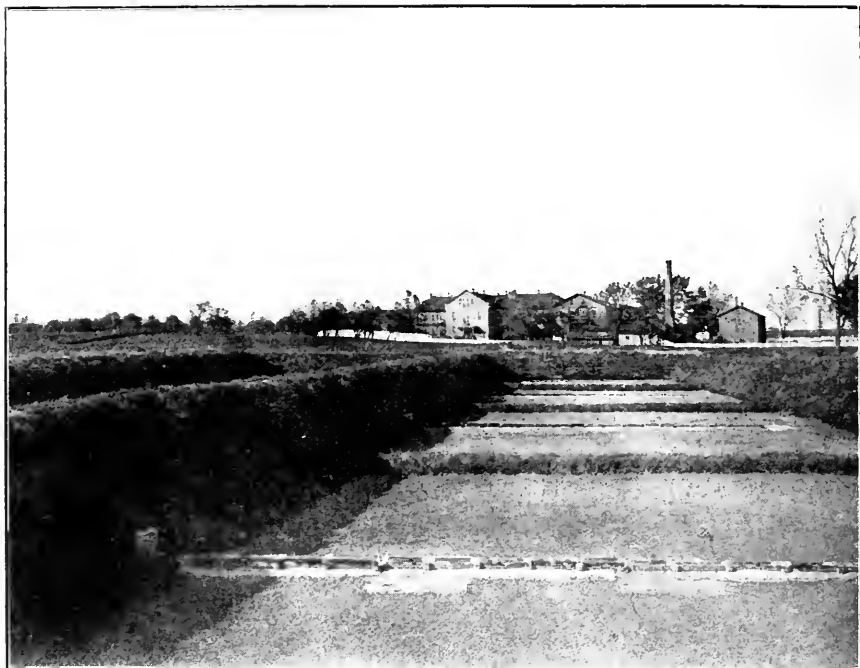
No. of Sample.	Description of Sample.	Date and Hour of Collection.	Color.	Turbidity.	Sediment.	Odor.	Oxygen Required.
3258	Kraut juice.....	Nov. 17, 1903.....	.....	475	very slight	5 kraut	5,270.0
3272	Kraut juice.....	Nov. 23 (?), 1903.....	.....	475	cons.	kraut	15,990.0
3259	Sewage (above kraut works.)	Nov. 17, 1903.....	10	240.5	dec.	5 oily sewage	45.32

(Parts per Million.)

Nitrogen as				Chlorine.	Alkalinity.	Increasing Constituents.	Solids.		Loss on Ignition.		No. of Sample.
Alb. Ammonia.	Free Ammonia.	Nitrites.	Nitrates.				Total.	Suspended.	Total.	Suspended.	
91.000	off	none	none	16660.	*5000	.....	57155	.....	23533	.....	3258
75.000	off	none	none	11880.	*13500	.....	64815	15784	13090	.....	3272
2.670	3.410	none	tr.	47.0	300	.....	2.041	.....	506	.....	3259

*Acid.

The cost of the plant, including land, was about \$5,000.00. and the amount spent annually for its care is about \$250.00.



Montgomery County Infirmary, Dayton. General View of Filters and Buildings.
Also Shows Method of Applying Sewage.



Montgomery County Infirmary, Dayton. General View of Filter Beds.

MONTGOMERY COUNTY INFIRMARY,
NEAR DAYTON.

The infirmary has a population of 400, and is located a few miles west of Dayton on high rolling ground. The pollution of a small stream by the sewage of this institution caused law suits and compelled purification works to be put in.

The sewage from the three buildings comprising the institution is conveyed into covered flush tanks of 12,000 gallons capacity, located a few hundred feet south of the buildings; the average daily flow is about 25,000 gallons. At the entrance to the tank it passes through a removable wire basket which holds back the coarser solid matter. Every few days this basket is washed with a hose, and as much as possible of the solid matter broken up and forced through, while the matter still remaining is removed.

The flush tank discharges automatically upon sand filters located about 500 feet south from it. The time occupied in discharging is about ten minutes and the frequency of discharges is about twice each day.

This tank is frequently cleaned by means of sprinklers placed near the bottom and connected with the waterworks system so that whatever deposit that might be left after the automatic discharge occurs is forced out to the beds.

The sand filters are eight in number, each 50 feet square, making a total area of about one-half acre. They were constructed by excavating the ground to the proper depth, (considerable excavation being necessary in order to place the filter low enough to receive the flow from the flush tank) and laying two lines of 4-inch underdrains 25 feet apart and 12.5 feet from the sides of the beds, laid in depressions in the bottom of the filter. The 4-inch drains enter a 6-inch drain, which conveys the effluent to the brook. The filtering material is 4 feet in depth over the underdrains and 3 feet in depth at points midway between them and is graded as follows:

1st. Over underdrains and bottom of filter is a 6-inch layer of gravel screened to not less than one-eighth inch.

2nd. A 2 or 3-foot layer of unscreened gravel.

3rd. A 6-inch (top) layer of clean sand.

The following are analyses of the material:

MECHANICAL ANALYSIS OF FILTERING MATERIAL.

Northeast Bed.			Southwest Bed.		
Depth	Effective size mm.	Uniformity coefficient	Depth	Effective size mm.	Uniformity coefficient
Surface	0.16	2.3	Surface	0.22	2.7
0.5	0.25	3.0	0.5	0.28	7.2
1	0.28	12.9	1.0	0.30	7.0
2	.40	8.0	2.0	0.34	7.3
3	.22	10.2	3.0	0.29	9.5
4	.24	15.4	4.0	0.24	8.3
Average	.28	11.6		.29	8.0

The sewage is distributed over the surface of the beds in the following manner: Across the center of each bed is a line of one-half tile pipes of size diminishing from 12 inches to 4 inches. At each reduction of size a small piece of tile is broken away, allowing the sewage to escape on to a 4-foot by 7-foot stone slab embedded in the sand, and thence over the bed surface.

The beds are used in turn; each bed receiving the discharge from the 12,000 gallon flush tank about every four days, which means a rate of 50,000 gallons per acre per day. At each dose the bed is flooded to a depth of about 8 inches. Except in winter the beds are thoroughly scraped after each dose. If a smaller amount of sewage were applied at each dose it is probable that less scraping would be necessary. The scrapings from the beds are used by fertilizing the grass lands.

During their three years of use several inches of sand have been removed from the beds during the frequent scrapings, and the material has become more compact, so that the average level of the bed is 6 inches lower than formerly. This settling would have been largely prevented if the beds had been furrowed each winter, and such furrowing would also have prevented freezing.

The effluent appears clear and causes no nuisance in the stream. Samples of sewage and effluent collected June, 1902, and August, 1903, show that the sewage is strong and that the effluent is not as well purified as would be expected from a plant so well designed and one to which so much attention is given. It is possible that such frequent cleaning allows the sewage to filter too rapidly for the best obtainable purification, or the dose applied to each bed is too large, considering the strength of the sewage.

CHEMICAL EXAMINATION OF SEWAGE AND EFFLUENT FROM MONTGOMERY COUNTY INFIRMARY—DAYTON.

(Parts per Million.)

No. of Sample.	Description of Sample.	Date and Hour of Collection.	Color.	Turbidity.	Sediment.	Odor.	Oxygen Required.
2254	Sewage.....	June 4, '02, 7 a. m.-6 p. m.....	.....	150	much	foul	90.11
2987	Sewage.....	Aug. 20, '03, 7 a. m.-6 p. m.....	.....	.....	much	.....	105.78
2256	Effluent.....	June 4, '02, 5 p. m.....	.....	80	dec.	5 sew.	43.86
3001	Effluent.....	Aug. 20, '03, day.....	.....	.....	cons.	.....	31.66
3002	Effluent.....	Aug. 20, '03, evening.....	.....	.....	sl.	.....	8.97

(Parts per Million.)

Nitrogen as				Chlorine.	Alkalinity.	Incrusting Constituents.	Solids.		Loss on Ignition.		No. of Sample.
Alb. Ammonia.	Free Ammonia.	Nitrites.	Nitrates.				Total.	Suspended.	Total.	Suspended.	
12.400	102.00	none	none	129.0	762	7	792	.....	311	.....	2254
7.320	44.550	none	none	87.2	412	.....	749	.....	399	.....	2987
3.370	5.200	11.000	58.000	70.0	431	135	1,133	.....	314	.....	2256
3.840	12.130	none	0.50	67.6	435	.....	752	.....	234	.....	3001
.910	1.780	.270	21.6	55.2	312	.....	916	.....	356	.....	3002

The cost of the plant was about \$6,000, itemized as follows:

1,000 feet of 8-inch sewer	\$200 00
Flush tank	131 53
Siphon	50 00
Screen well and basket	85 00
Manholes and valves.....	242 67
Water main to tank, sprayers, etc.....	655 00
Excavation, 8,000 cubic yards	800 00
Stone slabs	270 00
Sand and gravel, 3,900 cubic yards	3,382 50
Carriers	42 00
Underdrains and excavating ditch	237 50

The annual cost of maintenance is the wages and board of one man and amounts to about \$450.00.

DELAWARE.

This city has a population of about 8,000 and is located upon the Olen tangy River, which at this point has a watershed of about 400 square miles and a dry weather flow at times of not more than 4 or 5 cubic feet per second.

A water supply was installed in 1889. The daily consumption is about 500,000, or 133 gallons per consumer.

Though for many years there have been private drains and storm sewers discharging into the river, a general system of sanitary sewers was planned in 1901, and about ten miles have been built up to the present time. There are 160 connections, said to accommodate about 1,600 people. Eight of the connections are from hotels and factories.

With the exception of a small amount of roof water, nothing but domestic sewage is discharged into the sewers. As there are no sub-drains, however, more or less ground water finds its way into them. The daily flow is estimated at from 100,000 to 200,000 gallons, according to the amount of leakage from ground water.

Purification works, located on low land near the river about one-half mile below the edge of the city and 1,600 feet from the nearest house, were built in June, 1903. On account of the low elevation, they are surrounded by a high dike to keep out floods, and automatic valves, as described below, are also provided for the same reason. These works consist of septic tanks and contact beds, and are similar in design to those at Westerville.

The sewage on reaching the works first passes through a valve chamber, where it is automatically diverted to the river in case of extreme flood. Then, after passing through a grit chamber, it enters the septic tanks, which are two in number, one tank 15 feet by 50 feet by 7 feet deep, and the other 30 feet by 50 feet by 7 feet deep, thus giving a capacity of 45,000 and 90,000 gallons respectively. Either one or both tanks may be used so that the proper septic period may be obtained. Both are being used at present. The entrance to the tanks is through 6-inch pipes about two feet below the surface: one pipe for the smaller tank and two for the larger. An iron plate, bolted to the wall just above the inlet, is extended across the ends of the tank for the purpose of causing an even flow through it. The sewage is drained off through a horizontal 6-inch slotted pipe placed about two feet below the surface across the lower end into a collecting channel which conveys it to a second chamber, where it would be automatically diverted to the river in case of floods of ordinary height. These automatic valve chambers are intended to prevent the flooding of the works through the outlet pipes. Still a third such chamber, placed between the works and the river, pre-

vents back flooding of the main sewer as well as assists in preventing the flooding of the works.

The sewage next passes to the contact beds, which are three in number. Each is 110 feet square at the surface, has an effective area of .22 acres, and is filled with 3 feet of fine coke, on top of which is placed a 3-inch layer of gravel in order to get proper distribution. One 12-inch outlet pipe or underdrain extends through the center of each bed and three 6-inch lateral drains, evenly spaced, lead into it.

For controlling the operation of the beds, automatic apparatus is provided, the principal features of which are:

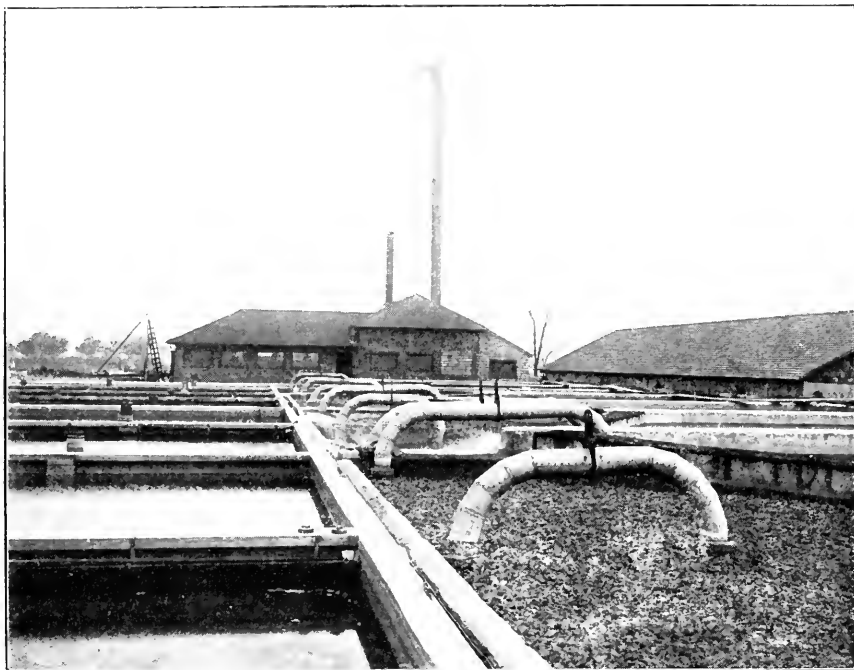
- 1st. An automatic distributor which receives the flow from the septic tank, and which contains three outlets, each leading to a special contact bed, and three float chambers, each connected with a special contact bed by a small pipe entering the bed near the surface.

- 2nd. Three automatic discharging siphons, one at the outlet of each bed. The compressed air under the bell of each siphon is controlled by a valve, which in turn is controlled by a float regulated by the height of sewage in one of the other three beds. The effect which the apparatus is designed to produce is this: when one bed is filled to the proper level the flow of sewage is diverted to another bed, while the bed next previously filled is caused to drain. Thus, at any time, one bed is being filled, one standing full, while the third is either draining or standing empty.

Since its installation the plant has worked satisfactory only a small portion of the time. This is due to the lack of interest and care on the part of those in charge. The first difficulty seemed to be the failure of the automatic apparatus to distribute the sewage properly, so that it flowed continuously through the contact beds. Later an unusually high flood rose over the dikes, with the result of rendering the plant useless. A 4 to 5-inch deposit of clay mud was left upon the beds as well as over the rest of the plant. On inspection the tank was found to contain about 1.5 feet of deposit in the bottom, which, besides being due to the flood, was due to the lack of care in cleaning out the grit chamber and possibly through not studying the operation of the tanks and determining the proper septic period. There is no way of removing this deposit except by hand or by pumping. Doubtless the clay has been washed into the coke so as to greatly decrease the capacity of the beds.

With the present comparatively small flow of sewage the plant should easily do the work assigned it, but a thorough cleaning must be given it and intelligent and constant care used in operating it, before any good results can be obtained. It is especially important that the attendant in charge should have a thorough knowledge of the automatic apparatus, as this is very likely to get out of order and seriously impair the efficiency of the plant.

The cost of the plant was \$12,900. The cost of maintenance has been nothing up to the present time, but the time of one man for about an hour each day should be spent in taking care of it.



East Cleveland. General View of Works Showing Air Ducts Leading to Primary and Secondary Filters. Septic Tank on Right, Aerators on Left.



East Cleveland. View of Aerators With Effluent Well in Background.

EAST CLEVELAND.

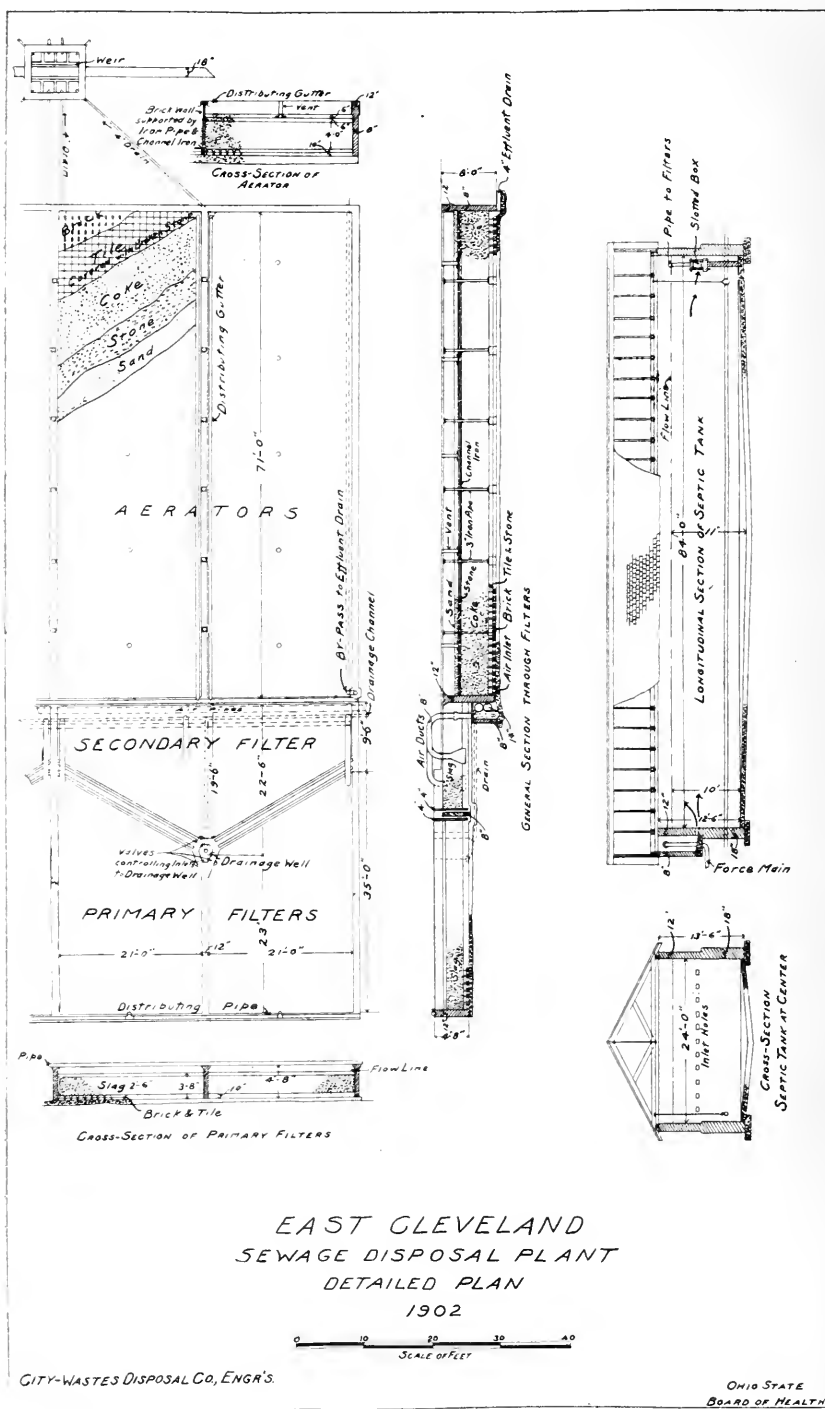
East Cleveland is a village having a population of 6,000, located immediately east of the city of Cleveland, two miles south of the shore of Lake Erie, and covers an area of about ten square miles. A small stream, often dry in summer, passes through this village, and thence through the village of Collinwood to the lake.

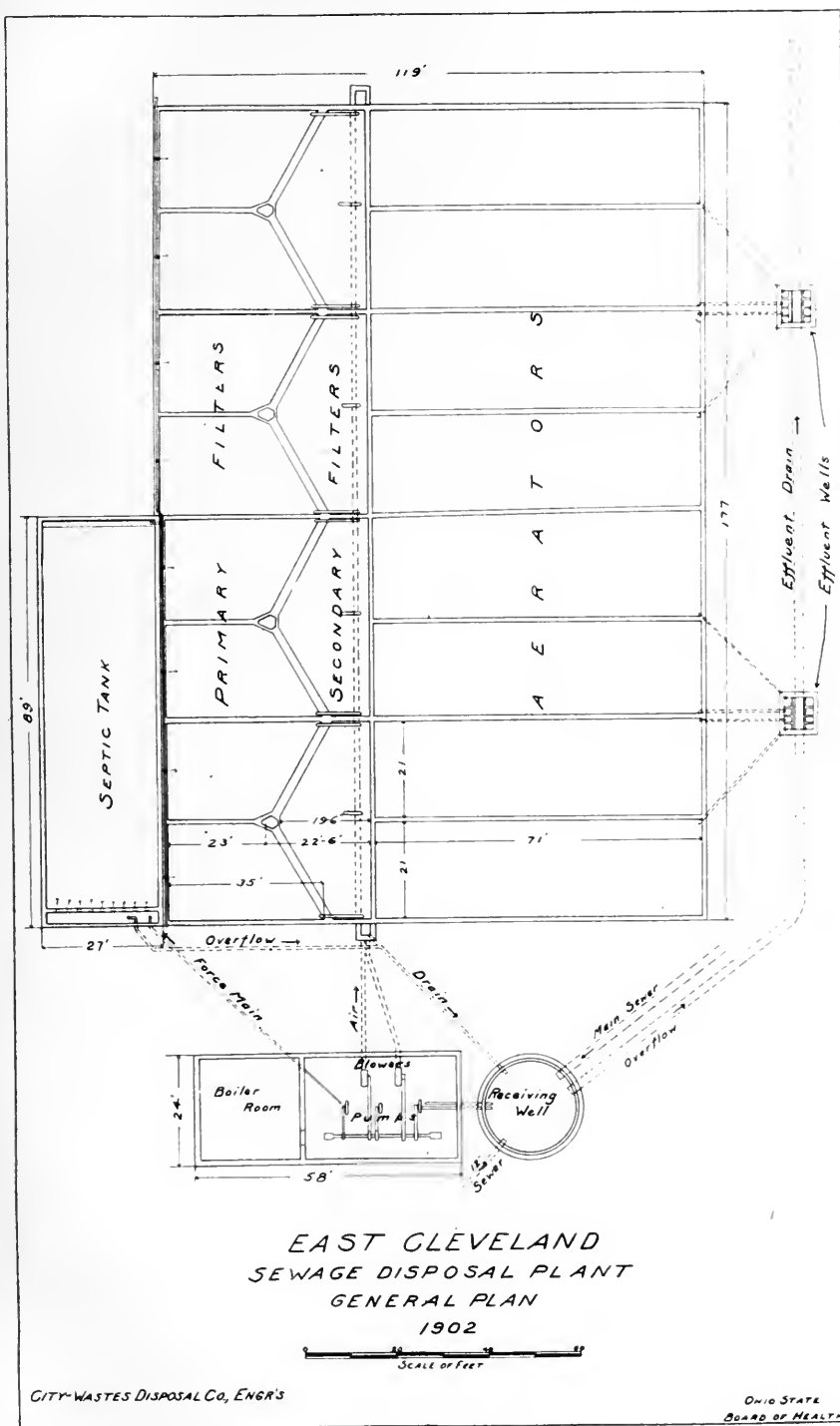
East Cleveland was incorporated as a village in 1895, with a population of 1,000, and no public improvements; since then it has installed waterworks, sewerage, sewage disposal and has paved and lighted its streets. The water is supplied from the Cleveland waterworks, and the average daily consumption is about 400,000 gallons, or 67 gallons per capita, nearly all the inhabitants being supplied.

A system of sewers covering the entire village was begun in 1898 and is now completed. There are 40 miles of sanitary sewers, having 1,005 connections, and used by at least 5,000 people. The sanitary sewers are provided with underdrains which collect much ground water and there are also several miles of storm sewers. These latter are, in places, laid in the same trench with and above the sanitary sewers, so that in time of heavy rains much storm water leaks out from the storm sewers and into the sanitary sewers with the result of greatly overworking the purification plant. The dry weather flow of sewage, judging from several inspections, is about 400,000 gallons per day, but this is increased by ground water up to 1,400,000 during several months in the year.

In the latter part of 1899, simultaneously with the construction of the sewers, purification works were built and put in operation. The comparative scarcity and high value of vacant land, together with the fact that no suitable filtering material could be obtained without hauling from a distance, prevented intermittent filtration from being considered. The topography of the village made pumping necessary with any form of disposal. The plant is located on a twelve-acre lot owned by the village in the northerly part of the corporation, and one-half mile from the edge of the thickly built up portion. There are a dozen houses within 1,000 feet, the nearest being 400 feet distant, while a well traveled street passes within 600 feet of the plant.

The works are described as follows: The sewage enters an open receiving well, 20 feet in diameter and 27 feet deep, through two main sewers, one 24 inches and one 12 inches in diameter, so placed that the sewage falls several feet onto a horizontal iron screen of one-half inch mesh, which retains a considerable portion of the solids. The contact of the water with the screen is intended to break up a certain portion of the solids so that it will be more easily acted upon later by the





bacteria. Three centrifugal pumps, located in a wooden building adjacent to the well, raise the sewage continuously into a septic tank. The pumps are of such size that, worked singly or combined, seven different rates can be obtained. They are driven by a 25 horsepower Westinghouse engine, and two blowers which force air to the filters are belted to the same shaft.

The septic tank is a brick structure, 87 feet by 24 feet in area and 11 feet deep, covered by a wooden pitched roof, the top of which is 9 feet above the level of the sewage. The sewage enters the tank at mid-depth through eleven openings, each about 6 inches square and placed at regular intervals across one end. The sewage leaves the tank at the other end by the "collecting-box," 1.5 feet square in section, extending across the end of the tank at mid-depth. Horizontal slots, 12-inch by 2-inch in one side of the box, admit the sewage which then overflows through a 6-inch siphon at one end of the box. Equal velocities are then obtained over the width of the tank. As the tank holds 170,000 gallons the average time during which the sewage remains in the tank, based on a daily flow of 400,000 gallons, is ten hours, and the average horizontal movement is 1.8 inches per minute. A scum 2 inches thick forms on the surface of the liquid. After a year's use the tank was cleaned out and the solid matter at the bottom found to be two feet in depth.

The effluent from the septic tank is distributed upon the primary filters, which consist of eight masonry tanks, each 600 square feet in area, filled with 2.5 feet of coarse slag, of egg coal size. The slag rests upon inverted half tile pipe with open joints resting on bricks on the concrete floor of the tanks. This forms a large open space, through which the sewage flows to a core wall so constructed that the flow is directed upward between a first and second wall, over the top of the second wall in a thin film, downward between the second and third walls and then upward through the coarse material of the "secondary filters."

The primary and secondary filters are similar in construction, size and filtering material, although the latter are but four in number, and are so arranged that each receives the effluent from two primary filters and passes it upward through the slag.

Three or four of the primary beds are used at once, the sewage being applied to them continuously for about ten days, during which time a thick deposit is formed on top. They are then allowed to drain back into the receiving well and the surface is cleaned. The slag slowly becomes filled with solid matter and it is necessary about once a year to remove and thoroughly wash it, at an expense of some three hundred dollars. The secondary filters are used continuously for about the same length of time that the "primary filters" are, and are cared for in a similar manner.

The final treatment in the scheme of purification takes place in the

aerators, which are a set of two filters, each divided superficially into 4 areas of 20 by 70 feet, and having, as in the case of other filters, a false floor of inverted half sections of tile pipe upon which is the filtering material, consisting of 6 inches of coarse broken stone placed on the tile, then 4 feet of pea coke, then six inches more of broken stone upon which is a 4-inch layer of coarse sand to distribute the sewage evenly. The effluent for the secondary filters passes into a collection channel and then is applied to the sand surfaces of portions of these aerators continuously for about fourteen days, or until the rate is seriously retarded by clogging. They are then allowed to drain, the dirty sand at the top is taken off, thrown away and replaced by clean sand.

Perhaps the most important feature of the plant, and that which makes possible such rapid rates of filtration, is the aerating system, by means of which air is continuously forced into the open space beneath the filtering material of the aerators, and also to the primary and secondary filters. Short lengths of pipe pierce the sand covering of the aerators and allow the escape of the air and other gases which rise through the coke and broken stone. The air blast also serves to retard the rate of filtration and thus holds the sewage in contact with the material for a longer time.

The final effluent flows out from under the false floor through a trapped outlet into the effluent well and thence through the effluent sewer several hundred feet long, to the brook.

As first built, in 1899, the plant consisted of four primary filters, two secondary filters, and one aerator, these being called a *unit* and rated at a capacity of 150,000 gallons per day. The intention was to apply the fresh sewage directly to the primary filters continuously for periods not long enough to develop putrefactive conditions, and then while the filter was out of use to consume the sludge in it by means of the forced aeration. The plant under these conditions worked well for some time, as shown by the chemical analyses made for the village authorities. But, before eighteen months were up, due largely to the silt brought in by the sewers, the slag became so clogged that it had to be removed and washed two different times, and complaints were made about polluting the brook. Chemical analyses made by the Board in March, 1901, in spite of the above facts, showed a purification of over 85 per cent., as measured by the removal of albuminoid ammonia and oxygen consumed.

In the fall of 1901 a septic tank and extra unit were added, making the plant as above described. With this construction, in spite of the increased amount of sewage, there have been no complaints about polluting the brook and the village authorities appear to be satisfied with it. There are at times, however, offensive odors reaching those living nearest the plant, and this must be expected from the septic and stale sewage and the wet sludge which have to be exposed at the works.

The effluent was fairly clear and had a slight, though not offensive, odor at the time of inspection, except when the sewage had just been turned onto a fresh aerator. No complaints have been made about polluting the brook since the enlargement of the works in 1901.

Samples of the effluent were collected on April 19th, 1903, and November 10th, 1903.

CHEMICAL EXAMINATION OF EFFLUENT FROM EAST CLEVELAND.

(Parts per Million.)

No. of Sample.	Description of Sample.	Date and Hour of Collection.	Color.	Turbidity.	Sediment.	Odor.	Oxygen Required.
2750	Eff. from works	Apr. 19, 1903	20	tr.	.....	.....	8.92
3248	Eff. from works	Nov. 10, 1903	40	tr.	tr.	1 musty	7.16

(Parts per Million.)

Nitrogen as				Chlorine.	Alkalinity.	Incrusting Constituents.	Solids.		Loss on Ignition.		Bacteria per cc.
Alb. Ammonia.	Free Ammonia.	Nitrites.	Nitrates.				Total.	Suspended.	Total.	Suspended.	
1.660	4.000	.080	6.00	33.6	.....	.....	.....	.....	.....	.....	8,200
0.470	2.550	.140	22.0	44.6	94	70	449	30	142	129	.....

The cost of the plant was as follows:

Land	\$12,500 00
Receiving well, machinery and first unit	20,700 00
Septic tank, 2d unit and boiler.....	17,900 00
Engineering and patent rights	5,192 00
Total	<u>\$66,292 00</u>

The annual cost of operation, excluding capital charges, is as follows:

2 engineers (one day and one night).....	\$1,440 00
1 extra laborer	540 00
Fuel	700 00
Repairs and extra help	300 00
Total	<u>\$2,980 00</u>

FOSTORIA.

The city of Fostoria has a population of 8,000 and is located on Portage Creek, which is the east branch of the Portage River, at a point where this stream has a watershed of about thirty-five square miles. Judging from measurements of the Scioto at Kenton, the average dry weather flow of the stream at Fostoria is about 1.0 cubic foot per second, but as the stream is impounded above town for water supply purposes the actual flow through and below the corporation is very small, and the stream bed is often practically dry.

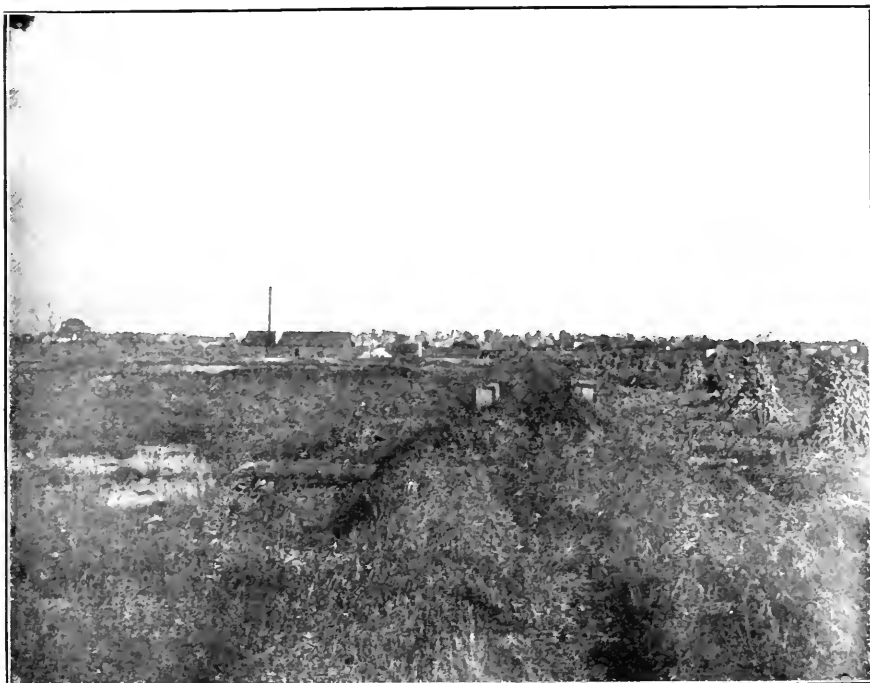
The waterworks were built in 1891. The average daily consumption is 572,000 gallons, which is used by about 3,500 people, making the amount used per consumer about 164 gallons per day.

The first sewers were built in 1894 and discharged into the east branch of the Portage River. These caused such a nuisance that the farmers below protested, and in 1895 plans were made by the city engineer for sewage purification by intermittent filtration with preliminary sedimentation in a reservoir from which the sludge was to have been drawn off, pressed and disposed of in a proposed garbage disposal plant which was to have been built in connection with the works. Construction was begun in 1896, but local politics prevented its completion. In 1898, more pressure being brought to bear by the farmers, the plant was completed, but in a cheaper manner than the original plans called for. It was then allowed to stand idle until 1900, when, on still further complaint by the injured farmers, it was put in operation and has been used in a more or less satisfactory manner up to the present time.

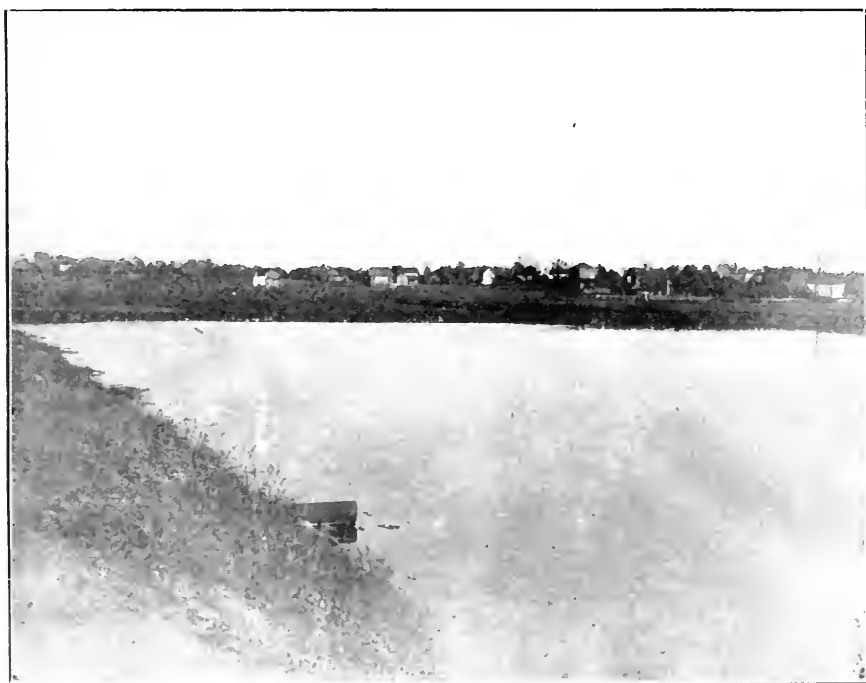
At present there are twenty-four miles of sewers, all on the combined plan, with storm water overflows at various points, into the creek. There are two 18-inch main sewers from different districts, which unite at the works. The health officer states that there are about 1,000 sewer connections, used by 6,000 people; only about 500 water closets are connected, however, so that not over 3,000 people discharge all their wastes into the sewers.

The dry weather flow of sewage is about 400,000 gallons per day, judging from several observations on the flow into the reservoir. During rainy weather the flow is several times this amount.

The purification works are located on a twenty-four acre lot owned by the city and bordering on Portage Creek at a point about one-half mile north of the corporation line. The Perrysburg road passes by this land, but there are no houses in the immediate neighborhood and no nuisance is caused to any one by the operation of the works.



Fostoria. General View of Filtration Area Looking East Toward Pump House.



Fostoria. View of Bed No. 2 Flooded With Sewage.

The sewage on reaching the works, through the two main sewers, enters a gatehouse and screen chamber, where solid matter too large to pass through a one-inch space is retained. It then passes into two covered reservoirs excavated in rock and lined with concrete, the arches being of masonry. Each reservoir is 100 feet by 30 feet in plan and 10 feet deep below the overflow, thus making a total capacity for both of 450,000 gallons. From here the sewage flows through floating outlets into a pump well. If desired, the sewage may be diverted at the gate chamber directly to the pump well without passing through the tanks. This is done when the flow is unusually large.

A centrifugal pump, located in a wooden pump house, raises the sewage from the pump well onto the filtration area, a vertical distance of about 20 feet.

Of the twenty or more acres of clayey soil available, though not favorable for filtration, six acres have been divided into beds of about one acre each for intermittent filtration, while fourteen acres have been ditched for broad irrigation. Two of the six intermittent filtration beds have been prepared by underdraining with lines of tile 16 feet apart, and entirely replacing the natural soil with excellent gravel brought from a distance, while the remaining four are underdrained in the same manner, but gravel is used only in the trenches directly over the drains. The main underdrain discharges into the creek near the pump house. The sewage is applied to each bed through two inlets on the same side, 100 feet apart; a pile of stone being placed under each inlet to protect the filtering material. No carriers are used to distribute the sewage over the surface of the beds.

The following analyses were made of the material on the gravel beds at different depths:

MECHANICAL ANALYSIS OF FILTERING MATERIAL.

Depth (feet).	Effective size, mm.	Uniformity. Coefficient.
Surface	0.12	7.1
0.5	0.29	16.9
1.0	0.29	15.5
2.0	0.40	9.0
3.0	1.10	4.3

The clayey soil, of which four of the beds and the broad irrigation field consist, has largely become compacted into hard, tough lumps from one-eighth to one-half inch in diameter.

The pump is able to take care of the flow of sewage, except for periods of several hours during hard rains, at which times the sewage overflows into the creek. The filtration area is forced to take more sewage than the character of the soil will permit being successfully puri-

nied, without the most careful attention being given to the care of the beds and the proper distribution of sewage upon them. The beds are allowed to become heavily coated with solid matter and are cleaned only once or twice a year, thus making it necessary to keep them always more or less covered with sewage and to give few chances for thorough aeration. The coarse character of the material in the gravel filters allows large quantities of sewage to pass through them in spite of the foul condition of their surfaces during a large part of the time; and it is these two gravel filters which prevent the works from being an entire failure. Two of the beds are let, at \$5.00 per season, for the purpose of growing corn upon them. This is likely to have a tendency to make the care-taker put less sewage on these beds than he otherwise would, and thus add to the work of the others.

The effluent appeared, at times of inspection, to be clear and inoffensive, and chemical analysis shows some purification, but not as much as could be obtained under proper operation.

The surfaces of the beds should be cleaned whenever a deposit of sufficient amount to noticeably retard the rate of filtration is formed; the bed should always be allowed to dry before cleaning. Each bed should be allowed to rest between the time of disappearance of the sewage from its surface and the time of applying the next dose. Since the sewage pumped from the bottom of the reservoir is much stronger than the average sewage, special beds should be prepared and used to filter this sewage only, thus greatly reducing the amount of sludge now distributed over the entire area.

The cost of the works was about \$25,000, \$3,700 of which was paid for land.

The annual cost of operation is \$900.00, consisting of labor of one man and fuel.

Samples of sewage and effluent have been collected at two different times

CHEMICAL EXAMINATION OF SEWAGE AND EFFLUENT
FROM FOSTORIA.

(Parts per Million.)

No. of Sample.	Description of Sample.	Date and Hour of Collection.	Color.	Turbidity.	Sediment.	Odor.	Oxygen Required.
2441	Sewage—main sewer...	Aug. 31, '02 7 a. m.-6 p. m...	55	275	dec.	5 oily	47.56
2444	Sewage—main sewer...	Aug. 31-Sept. 1, '02, 7 p. m.-6 a. m.	65	1200	cons.	5 oily	113.31
3352	Sewage—main sewer .	Dec. 16, '03, 8 a. m.-5 p. m....			dec.	sew.	16.66
2443	Effluent.....	Aug. 31, '02, 7 a. m.-6 p. m....	33	30	sl.	5 mus.	12.04
2446	Effluent.....	1902 Aug. 31-Sept. 1, 7 p. m.-6 a. m	31	35	sl.	5 mus.	11.56
3355	Effluent.....	Dec. 16, '03, 8 a. m.-5 p. m....		sl.	sl.	oily	9.23

(Parts per Million.)

Nitrogen as				Chlorine.	Alkalinity.	Incrusting Constituents.	Solids.		Loss on Ignition.		No. of Sample.
Alb. Ammonia.	Free Ammonia.	Nitrites.	Nitrates.				Total.	Suspended.	Total.	Suspended.	
3.360	13.450	none	none	143.4	254	33	823		251		2441
5.260	5.800	none	none	42.0	215	none	1700		423		2444
4.320	3.460	.250	none	27.7	314		860	319	268	100	3352
.965	3.025	.040	8.00	50.0	211	137	685		163		2443
1.055	3.725	.046	1.50	74.4	259	none	593		185		2446
0.660	5.440	.100	3.00	34.6	295		523		126		3355

OHIO HOSPITAL FOR EPILEPTICS AT GALLIPOLIS.

This institution, having a population of 1,000, is built on the cottage plan and located one mile northeasterly from the city of Gallipolis, on an elevated plateau near the Ohio River. The institution grounds drain directly into Mill Creek, a small intermittent stream which enters the Ohio River a short distance below the institution buildings.

The Insane Department, comprising one cottage occupied by some two hundred people, is located on Mill Creek at a considerable distance above the main buildings and has a sewerage system of its own. Formerly the sewage from all the buildings was discharged directly into the creek, but that from the Insane Department caused so much annoyance to the officers and inmates of the main buildings, and that from the main buildings created such a nuisance to those owning property and living along the stream below, that sewage disposal plants for each of the two portions of the institution were built.

SEWAGE DISPOSAL PLANT FOR THE PRINCIPAL BUILDINGS OF THE HOSPITAL.

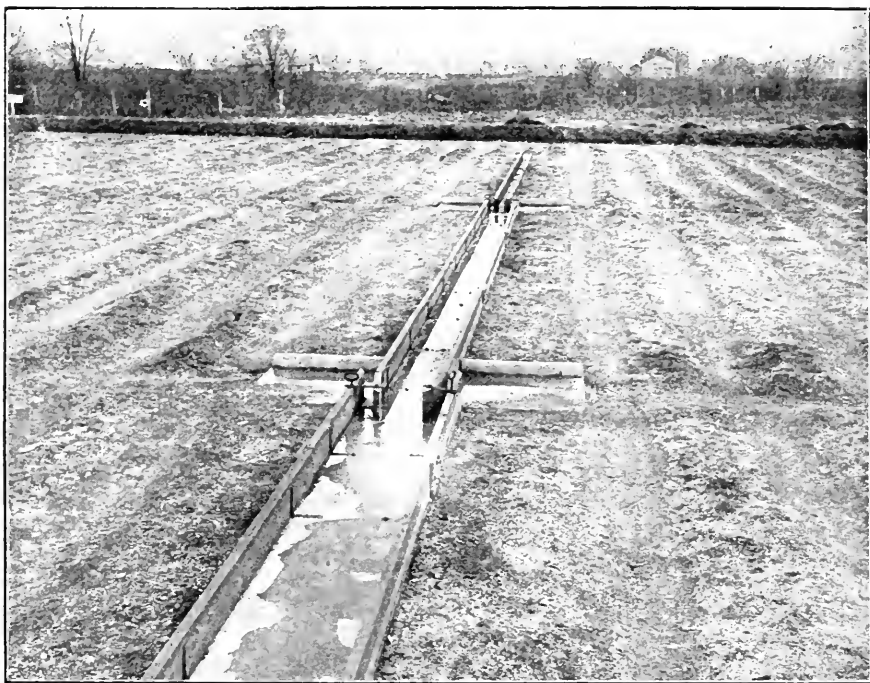
The principal or central buildings of the institution, i. e., all buildings except the Insane Department, contain a population of 800 and produce a flow of sewage estimated at 125,000 gallons per day.

The plans for the purification of this sewage, which are reproduced in this report, were prepared in 1898, and the works were put in operation in November of the following year. The system includes a large storage reservoir with an automatic flushing device, and eight intermittent sand filters.

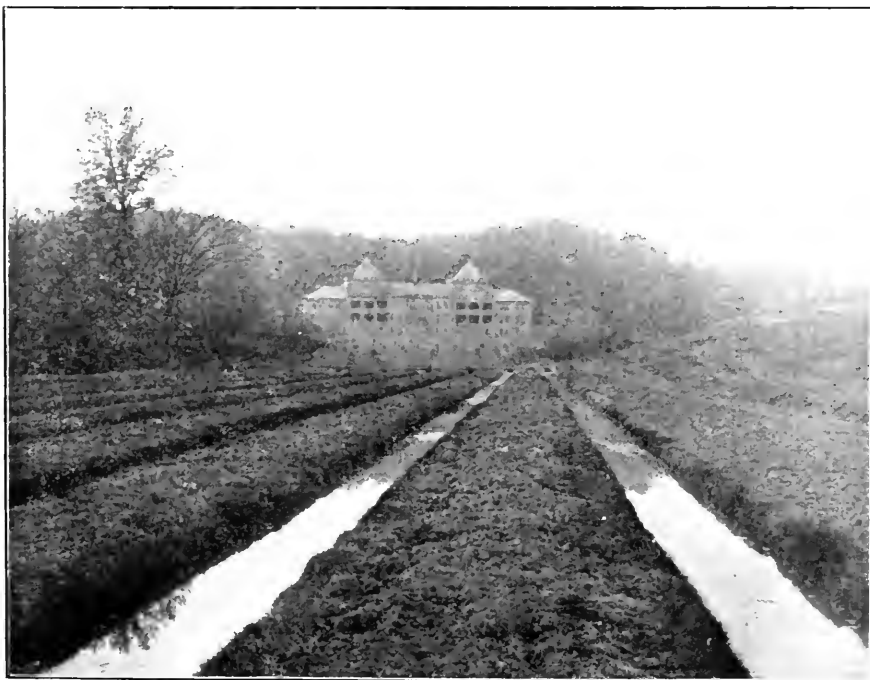
The sewage is collected from the various buildings by sanitary sewers leading to a 10-inch outfall sewer. This outfall leads to a gate chamber located on the lawn of the central campus south of the buildings. Here the sewage passes through a screen basket and into the reservoir, from which it is discharged intermittently by means of an 8-inch automatic "Miller" siphon.

At the gate chamber the sewage may be diverted, if desired, directly to the beds or to the creek through a former outlet. This chamber is covered by an ornamented gatehouse, from which the gates are manipulated and the screen basket raised for cleaning.

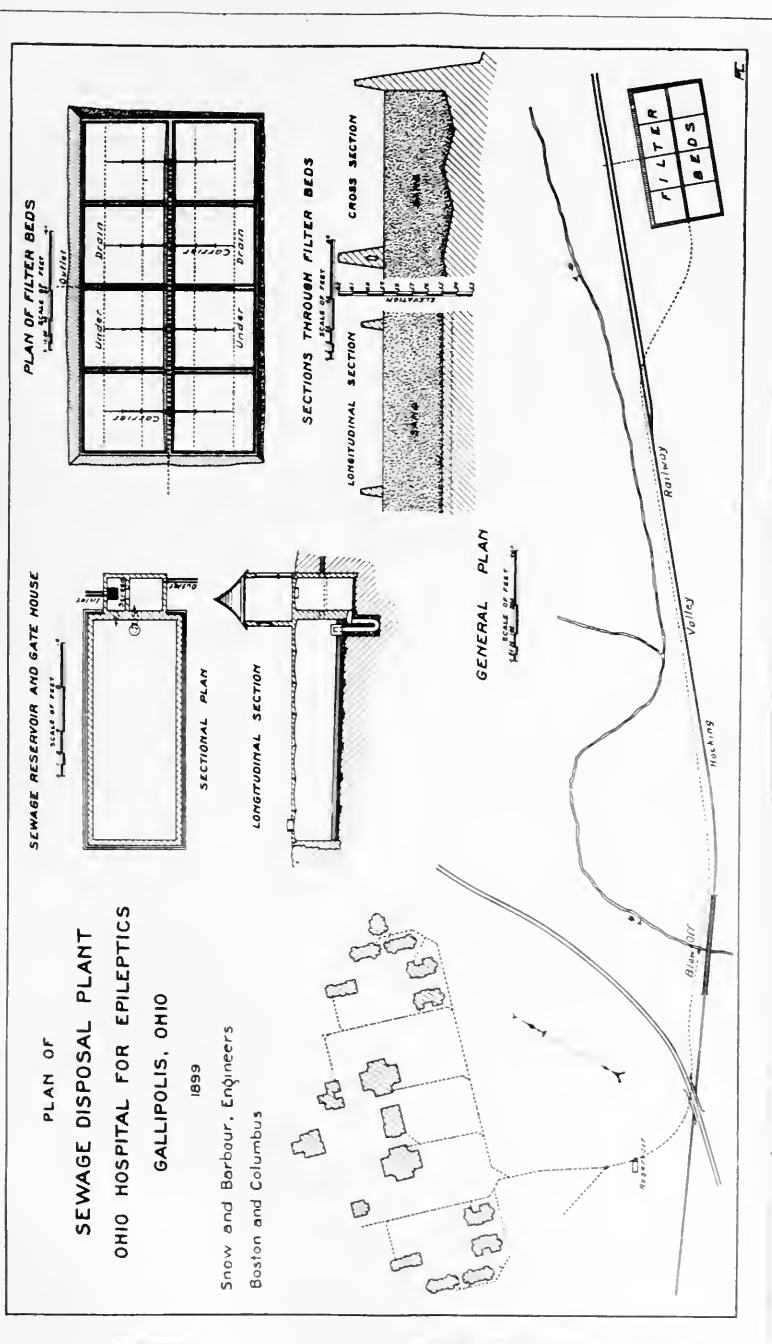
The reservoir, which is adjacent to the gate chamber, is of brick, 15 feet by 40 feet in plan, with an average depth of 6 feet, thus giving a capacity of 27,000 gallons, or one-fifth of a day's flow. The inlet and outlet are placed at the same end in order that the flushing action will keep deposits from accumulating in the bottom of the tank. Between the reser-



Ohio Hospital for Epileptics, Gallipolis—System for Principal Buildings. View Showing Method of Applying Sewage to Filters.



Ohio Hospital for Epileptics—Insane Department. View of Sewage Disposal System.



voir and the beds is an inverted siphon, consisting of some 3,600 feet of 10-inch cast iron pipe. This pipe has a continuous falling grade to Mill Creek, a distance of 1,000 feet, and on a continuous rising grade from that point to the beds. It is provided with a blow-off at Mill Creek, the lowest point. The elevation of the bottom of the reservoir, referred to average low water in the Ohio River, is 70.57, the elevation of the lowest point in the inverted siphon is 25 feet, and the elevation of the surface of the beds is 59.25 feet.

The filter beds are located near the Hocking Valley Railroad, about three-fourths of a mile east of the buildings. They are eight in number, each 100 feet square, thus making a total area of about 2 acres.

The natural surface was excavated to the proper elevation, the dividing embankments built and the bottoms of the beds shaped into shallow depressions 6 inches deep and 50 feet apart, in which 4-inch underdrains were laid and connected with an 8-inch drain leading to the creek. A layer of coarse gravel, 0.2 to 0.4 feet in thickness, was then placed over the drains and the entire bottom of the filter. On this was placed a 4-foot layer of sand, taken from a neighboring bank, which is represented by the following analyses:

FROM SEWAGE DISPOSAL PLANT FOR MAIN BUILDING.
MECHANICAL ANALYSIS OF FILTERING MATERIAL.

	Effective size, mm.	Uniformity Coefficient.
Bed No. 5.	0.32	4.1
Bed No. 6.	0.29	3.8

The sewage is conveyed through a carrier in the center embankment to wooden gutters of decreasing size. At each of the three changes of size in the gutters a chance is afforded for the sewage to escape on to a concrete slab and thus be distributed over the sand surface.

The outside embankment is built to such a height that only the most unusual floods of the Ohio River could reach the surface of the beds. Such a flood has not yet occurred, but, if it did, a most objectionable deposit of mud would render the beds useless until they were cleaned.

With a flow of 125,000 gallons per day one dose would be applied about four times during the daytime and once at night. One bed receives not more than two consecutive discharges in a day. The beds are used in sets of four on alternate days. The surfaces are cleaned with a

ake about every two weeks and are thoroughly loosened once a year. In the proper season the beds are furrowed and a luxuriant crop of corn grown upon them. In winter they are also furrowed to prevent freezing.

The effluent is of good appearance and causes no pollution in the creek. The following samples have been analyzed.

CHEMICAL EXAMINATION OF SEWAGE AND EFFLUENT FROM DISPOSAL WORKS OF MAIN BUILDINGS.

(Parts per Million.)

No. of Sample.	Description of Sample.	Date and Hour of Collection.	Color.	Turbidity.	Sediment.	Odor.	Oxygen Required.
2298	Sewage—main sewer...	1902 June 16-17; 7 p. m. -6 a. m....	33	52	cons.	sew. 5 oily	17.18
2299	Sewage—main sewer..	June 17; 6 a. m.-7 p. m.....	27	77	cons.	sew. 5 oily	18.54
2283	Effluent.....	June 16-17; 7 p. m.-6 a. m....	13	tr.	tr.	2 mus.	1.76
2301	Effluent.....	June 17; 6 a. m.-7 p. m.....	20	tr.	tr.	tr. mus	1.71

(Parts per Million.)

Nitrogen as				Chlorine.	Alkalinity.	Incrusting Constituents.	Solids.		Loss on Igni- tion.		No. of Sample.
Alb. Ammonia.	Free Ammonia.	Nitrites.	Nitrates.				Total.	Suspended.	Total.	Suspended.	
2.520	30.400	none	none	111.6	279	59	602		164		2298
2.900	9.700	none	none	105.4	221	38	571		157		2299
.415	.230	.005	.005	107.8	146	110	677		162		2283
.540	.145	none	18.00	101.8	159	99	693		200		2301

The cost of the plant was \$13,600, of which \$1,126 was paid for land, \$1,590 for the gatehouse and \$2,177 for the main sewer. The cost of maintenance is the wages of one man at \$35 per month.

INSANE DEPARTMENT DISPOSAL WORKS.

Disposal works for the Insane Department, which, as above mentioned, is located some distance away and has a separate drainage system from that of the main buildings, were put in operation in May, 1898. The 200 or more inmates and attendants produce about 15,000 gallons of sewage per day.

The works comprise a storage reservoir, fitted with an automatic flushing device and eight sand trenches, or elongated beds, upon which the sewage is discharged at intermittent periods.

The reservoir is an underground brick chamber 10 feet by 12 feet in plan and 6 feet deep below the flow line, thus giving a capacity of 8,000 gallons. A wire basket placed under the inlet pipe serves to remove the coarse solids from the sewage. This basket is 3 feet square at the bottom and 3 feet deep, and can be easily removed for cleaning.

The automatic siphon which is placed in a manhole at one end of the reservoir discharges into an 8-inch sewer leading a short distance to an open wooden trough which runs along the upper ends of the sand trenches. This trough is provided with wooden gates so that the sewage may be directed to any or all of the beds at one time.

The trenches are 3 feet wide, 4 feet deep, from 300 to 400 feet long and are placed 10 feet apart. They are filled with 3 feet of sand, graded on the surface to a slope of about 2 inches per 100 feet, so that the sewage will flow the full length of the trench. The total area of sand is one-eighth acre.

MECHANICAL ANALYSIS OF SAND FROM SEWAGE DISPOSAL WORKS OF THE INSANE DEPARTMENT.

	Effective size, mm.	Uniformity Coefficient.
Westerly trench.	0.27	3.0
Trench adjacent to westerly trench	0.28	3.2

At the upper end of the beds, opposite the gates, the bottom and sides of each trench are paved for about eight feet with a concrete and laid in cement in order to prevent the sand from being washed out. The trenches are underdrained every 20 feet with lines of 4-inch tile pipe, which are laid at right angles to the length of the trenches, which are intercepted by a 6-inch sewer pipe leading to the creek. The automatic

siphon discharges usually twice daily. Four trenches are used at a time. After one set receives two doses the gates are changed and the four other trenches put in use. The surface of the sand is cleaned with a rake every two or three weeks and it is spaded up two or three times a year. The strips of natural soil between the trenches are of a decidedly clayey nature and rather impervious to water. On these strips there is raised each season a small crop of beans. These strips are fertilized to some extent by seepage from the trenches and also by sprinkling sewage over them with a spade.

**CHEMICAL EXAMINATION OF SEWAGE AND EFFLUENT FROM
DISPOSAL WORKS OF THE INSANE DEPARTMENT.**

(Parts per Million.)

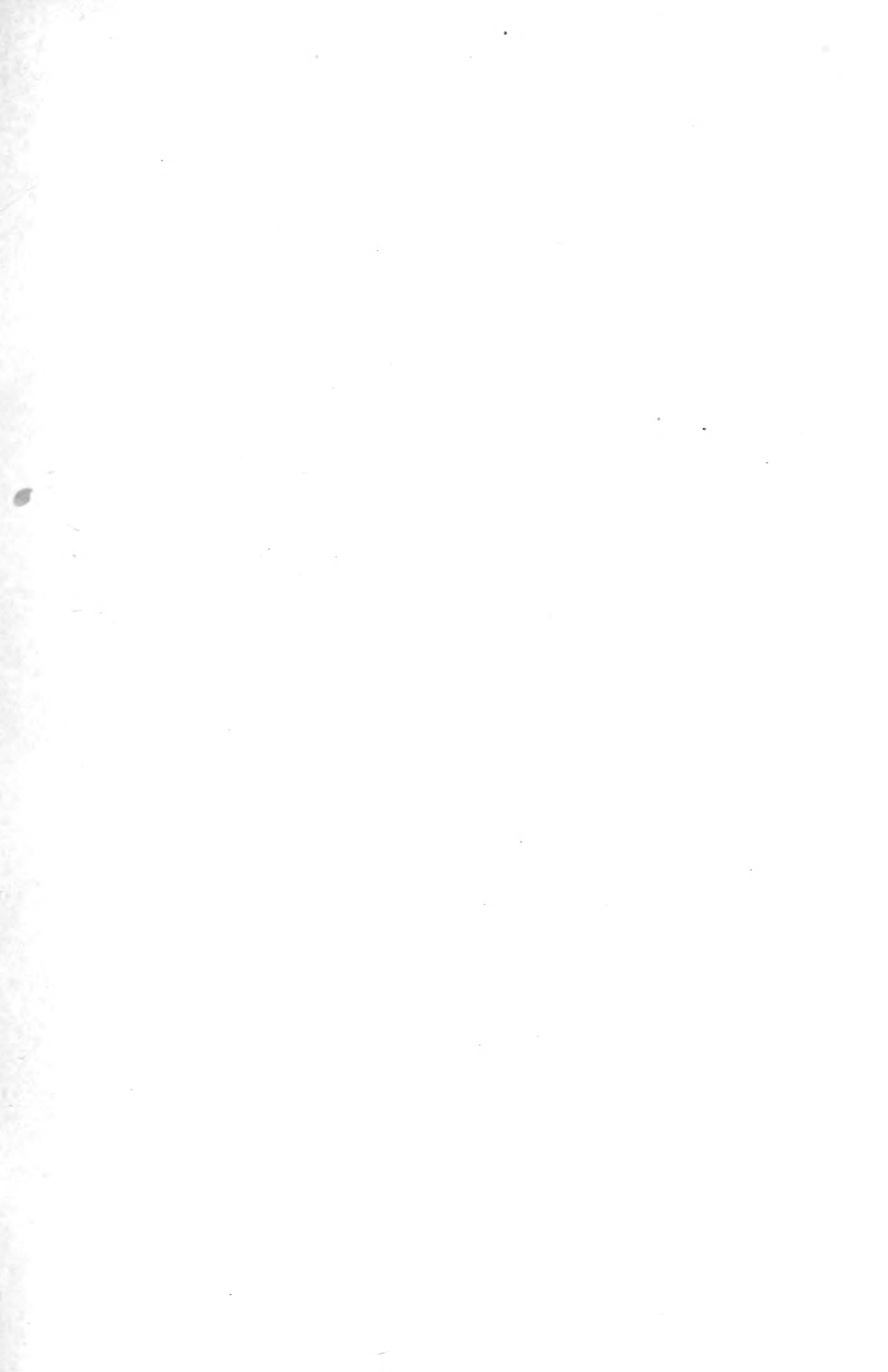
No. of Sample.	Description of Sample.	Date and Hour of Collection.	Color.	Turbidity.	Sediment.	Odor.	Oxygen Required.
2292	Fresh Sew. Insane Ward Beds	1902 June 17; 3:45 a. m.-3:55 p. m.	30 off	145	cons.	sew. 5 oily	48.06
2295	Fresh Sew. Insane Ward Beds	June 17-18; 3 p. m.-4 a. m. . . .	32	80	cons.	sew. 5 oily	26.26
2294	Effluent.	June 17; 4:10 a. m.-3:20 p. m..	20	s.	s.	3 musty	3.41
2297	Effluent.	June 17-18; 3:10 p. m.-4 a. m..	23	s.	s.	3 musty	3.82

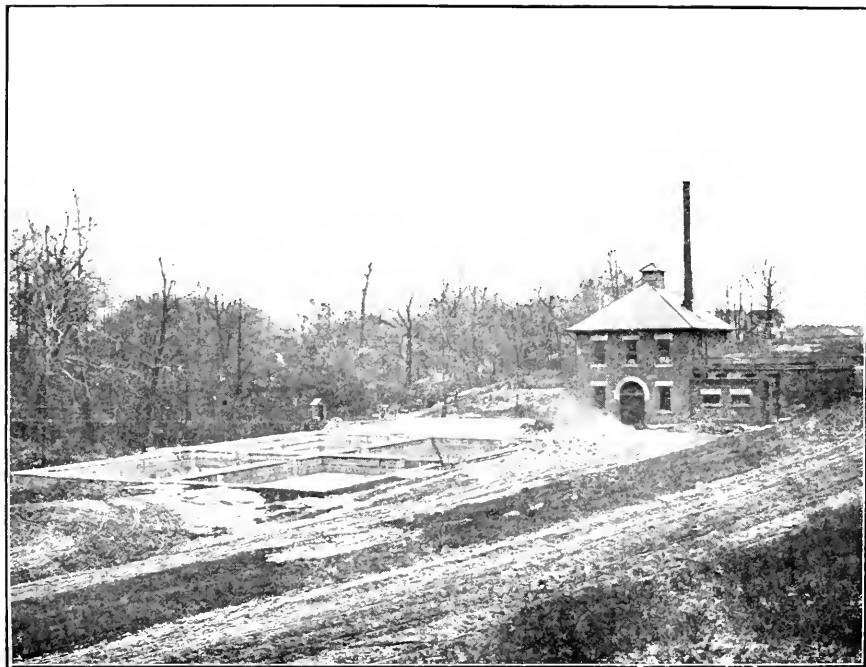
* (Parts per Million.)

Nitrogen as				Chlorine.	Alkalinity.	Incrusting Constituents.	Solids.		Loss on Igni- tion.		No. of Sample.
Alb. Ammonia.	Free Ammonia.	Nitrites.	Nitrates.				Total.	Suspended.	Total.	Suspended.	
4.630	15.800	none	none	90.0	287	36	790		296		2292
4.520	26.910	none	none	96.0	259	57	644		265		2295
.410	3.150	.460	12.00	82.2	140	85	561		155		2294
.530	2.595	.560	14.00	86.0	133	100	603		180		2297

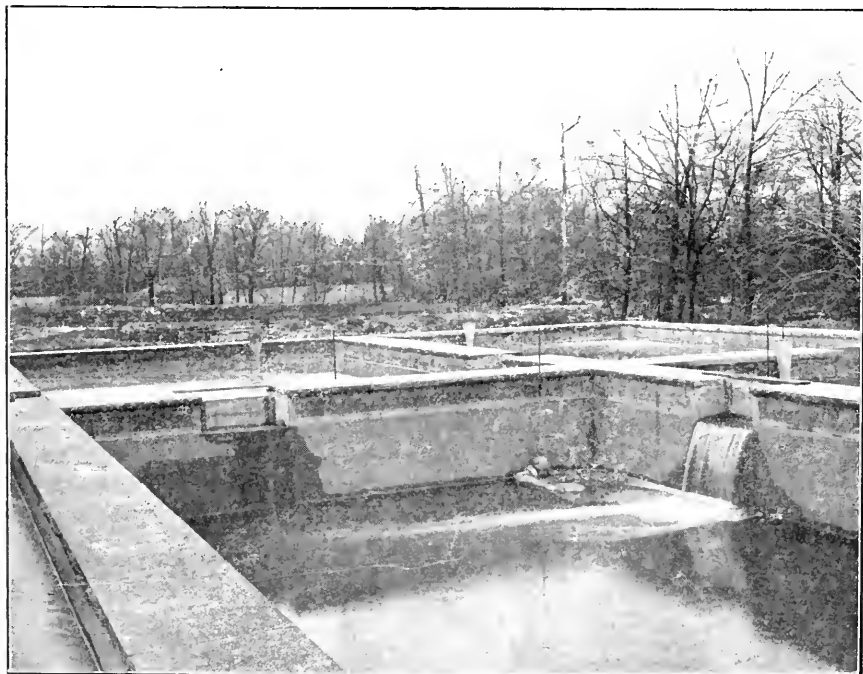
The disposal area causes some unpleasant odor, but from appearances is doing fairly good work, so far as keeping the stream in good condition is concerned. The effluent is a little cloudy and contains some suspended matter when it first appears in the underdrains, but it soon clears and remains satisfactory, physically at least, until the next dose of sewage is applied.

This system cost complete about \$700.00, and its cost of operation consists of the value of the time consumed in changing the gates daily, besides the cost of the time of one boy for one day each week spent in raking and spading.





Glenville. General View of Chemical Buildings and Tanks.



Glenville. Precipitation Tanks With Coke and Sand Filters in Background.

GLENVILLE.

The city of Glenville, having a population of 7,000, is located on the shore of Lake Erie, adjacent to the easterly boundary of the city of Cleveland. Dugway Brook, a small stream having a flow of two or three cubic feet per second, passes through the center of the city and empties into the lake.

Previous to 1897 there were no sewers and much trouble was caused by flooded cellars and cesspools. About this time the city, then a village, submitted plans to the State Board of Health for a sanitary sewer system with an outlet into Dugway Brook. The Board disapproved this outlet because of the nuisance it would cause along the course of the brook and along the lake front. Accordingly plans were made and approved by the Board for purifying the sewage by chemical precipitation, followed by contact treatment in coke beds and then by intermittent filtration through sand. The plans are given in detail in the 1897 report of the State Board of Health. Only one-half of the filtration area, as shown by this plan, has been built, and, owing to some mismanagement, it is said that sand of a poorer quality than that proposed for intermittent filtration was put in. Only one-half of the contact beds proposed have been built and the purification tanks have been arranged differently.

The city receives its water supply from the Cleveland waterworks. The average daily consumption is 500,000 gallons, this being 60 gallons per consumer.

At present there are ten and one-half miles of sewers and 850 connections representing, on the basis of five persons a connection, 4,250 people. The average daily flow of sewage is about 300,000 gallons. The sewers are all on the separate plan except at one place, where a catchbasin discharges a considerable amount of street wash into the sewer, which causes trouble at the disposal works by wearing the pump valve. When the flow is increased by storm water it is probably run direct into the creek. The sewers are underdrained. There is no manufacturing waste and no cellar or roof water discharged into them.

The plant was completed in May, 1899. It is located on a fourteen-acre tract of land, owned by the city, in the valley of Dugway Brook, adjacent to the Lake Shore and Michigan Southern Railroad tracks, 500 feet east of the edge of the thickly settled part of the city. There is one house, that of the attendant, but 200 feet away. There is said to be no odor disagreeable to the occupants of this house or to the residents of the city. There is, however, a musty odor due to the sewage and lime around the buildings, tanks and fresh sludge heaps.

A two-story brick building about thirty-five feet square, the second story of which is accessible through a driveway, is used as a boiler, pump and chemical house. The main sewer passes through a channel beneath the floor of the boiler room, where lime water is introduced into the sewage and where the larger solid matter is taken out by means of a screen having one-half inch open spaces. The lime mixing tank, 5 feet in diameter and 5 feet high, is constantly stirred by means of a small engine. The sludge press is located over the sewage channel and the sludge pump is nearby.

After passing through the house the sewage enters one of the four concrete precipitation tanks, each of which is about 30 feet square, 7 feet deep in the center, and holds 40,000 gallons; thence it flows continuously through the remaining three tanks and on to coke contact beds. The tanks and distributing channel are so arranged that any tank may be cut out of use for the purpose of draining off the sludge. This is done by drawing off through a floating outlet the supernatant water, after the contents have remained at rest several hours to permit thorough sedimentation, and then opening a valve which allows the sludge to flow by gravity into the sludge well, from which it is pumped to the press.

The contact beds are two in number, each 64 feet by 127 feet and contain two feet of coke breeze, over which is placed four inches of gravel in order to obtain an even distribution of the sewage. The beds are underdrained by a 20-inch sewer pipe through the center, with 6-inch branches at intervals of 8 feet. The underdrains are covered with large pieces of coke. From these beds the effluent can be turned either onto the sand filters or directly to the creek.

There are four sand filters, each 0.25 acres in area and having three feet of sand. The filters were constructed by grading the natural surface and filling in with sand hauled from a neighboring bank. There are eight lines of 4-inch underdrains across each bed; these are about 10 feet apart and surrounded by cinders.

MECHANICAL ANALYSIS OF FILTERING MATERIAL.

	Effect size, mm.	Uniformity coefficient.	Remarks.
Sand in sand filters	0.09	2.1	Contains fine dust and clay.
Gravel over coke beds	1.8	4.0	

About two and one-half tons of sludge are pressed daily and this is dumped at any convenient point on the land owned by the city. Part of the land originally intended for sand filters is now covered by heaps of sludge. The farmers take but little of it away.

As at present operated, no chemicals are used during the night, and the sewage flows day and night continuously through the precipitation tanks (except when one is cut out of service for cleaning, which occurs three times a week); thence it is run continuously through each coke bed for a day or more at a time, instead of operating them as contact beds. The gravel surface covering of these beds prevents much suspended matter from reaching and filling up the open spaces of the contact material, as it would if the tank effluent were applied directly to the coke. The gravel becomes covered with thick deposits and is overgrown with weeds and is scraped and washed every two or three months.

The sand filters, being of such fine material, would require much care if used continually. They are, therefore, rarely used and are overgrown with thick weeds. They have also been damaged by floods from the creek. Whenever sewage is applied to them the effluent is said to be very clear and sparkling.

Although designed to produce a twice filtered and highly purified effluent, as actually constructed and operated, the plant treats the sewage only by chemical precipitation, supplemented by a mechanical straining out of the suspended matter by the gravel surface of the coke beds. The resulting effluent, though it undergoes little nitrification and possesses a musty odor, contains little suspended matter and produces no apparent pollution in the small stream which receives it.

The plant has cost to date, exclusive of land, about \$20,500, of which \$4,000 was paid for the sand filters, \$6,000 for the building and machinery, and \$4,500 for tanks and sludge well.

The cost of operation is about \$2,300 per year, consisting of \$1,320 for salaries of two attendants, \$600 for lime, \$300 for fuel, and \$80 for incidentals. About six bushels, or 420 pounds, of lime are used each day at a cost of twenty-five cents per bushel, or a daily cost of \$1.50.

The following analyses show that there is considerable reduction in organic matter as the sewage passes through the plant, but that no nitrification takes place.

CHEMICAL EXAMINATION OF SEWAGE AND EFFLUENT FROM GLENNVILLE.
(Parts per Million.)

No. of Sample.	Description of Sample.	Date and Hour of Collection.	Color.	Turbidity.	Sediment.	Odor.	Oxygen Required.
3222	Sewage from main sewer above works...	Nov. 4, 1903 Composite—forenoon.....	35	237	con	5 sew.	68.48
3225	Sewage from main sewer above works.....	Composite—afternoon.....	33	206	dec.	5 sew.	31.28
3223	Sewage— Entrance to coke beds	Comp.—forenoon.....	30	56	dec.	4 sew.	24.08
3226	Sewage— Entrance to coke beds	Comp.—afternoon.....	30	60	dec.	4 sew.	17.32
3224	Effluent—Coke beds...	Comp.—forenoon.....	17	sl.	v. sl.	4 musty	14.84
3227	Effluent—Coke beds ..	Comp.—afternoon.....	20	sl.	v. sl.	4 musty	7.70

(Parts per Million.)

Nitrogen as				Chlorine.	Alkalinity.	Incrusting Constituents.	Solids.		Loss on Igni- tion.		No. of Sample.
Alb. Ammonia.	Free Ammonia.	Nitrites.	Nitrates.				Total.	Suspended.	Total.	Suspended.	
4.560	15.860	tr.	none	36.9	307	99	766	299	215	145	3222
3.260	8.760	.002	none	43.7	71	228	742	239	228	137	3225
2.660	8.560	.003	none	30.6	250	152	583	57	155	73	3223
3.620	10.840	tr.	none	32.3	162	169	520	79	97	11	3226
1.480	8.500	.120	none	31.8	272	176	572	17	87	.....	3224
1.260	10.500	.003	none	30.4	25	198	514	.....	94	.....	3227

SHEPARDSON'S COLLEGE AT GRANVILLE.

At Shepardson's College, during the college year from September to June, there are about one hundred persons, and at other times there are about twenty-five.

A six-inch sewer, 2,200 feet long, conveys the sewage of the college buildings, which accomodate seventy-five students, the sewage of three dwellings and the sink drainage from four other dwellings, to a disposal field about one-third mile west of the institution.

The nearest house is within 500 feet and there are a dozen within 1,000 feet; it is said that no trouble has been caused by odors from the sewage.

The flow of sewage cannot be conveniently measured, but the dry weather flow is estimated at 4,000 gallons per day; while the flow in wet weather is much greater, due to infiltration.

The sewage is disposed of by broad irrigation methods, although the works were planned for intermittent filtration beds.

The field has an area of about one acre and was prepared to receive sewage by removing the surface soil and laying ten lines of 4-inch tile drains 2 feet below the surface thus prepared. Above the drains the soil is of a clayey nature containing a very small amount of sand; while below the drains the material is a coarse gravel mixed with clay.

The 4-inch tile drains enter a 6-inch underdrain leading to Raccoon Creek, a tributary of the Licking River.

The prepared surface is formed into ridges and depressions, the latter being 20 feet apart and located midway between the underdrains, thus bringing the ridges directly over the drains.

The sewage enters the disposal field at the center of the north side and flows into a cross ditch, from which it is turned into one or more of the parallel depressions, or longitudinal ditches mentioned above.

This distribution is accomplished every two or three days by filling in and cutting out the entrance to the proper ditches with a shovel.

The slope of the ditch is not sufficient to carry the sewage to more than one-third or one-half of the way down the field, so that a portion of the entire available area only is utilized. The tops of the ridges are about one foot above the lowest points of the ditches, so that the sewage rarely spreads out more than 3 or 4 feet, but stands in long narrow pools until it soaks through the fine soil or evaporates.

The position and depth of the underdrains, combined with the distribution of the sewage, renders it impossible for sewage to reach them. This is shown by the fact that there has never been any flow in the underdrains since they were constructed six years ago, except in very wet weather.

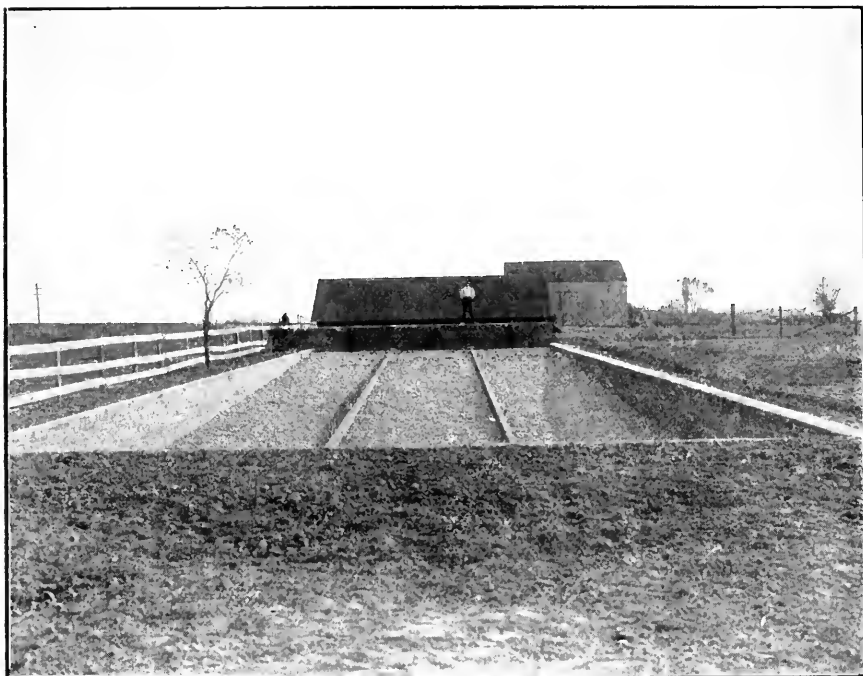
No care is taken of the surface of the fields except that the weeds and grass are occasionally mowed, the dry sludge being allowed to remain and form a thick coating in some places.

This system, considered from the standpoint of intermittent sand filtration, cannot be said to purify the sewage satisfactorily, and the only reason why it does not become a nuisance to the neighborhood is because the amount of sewage is very small compared to the area used.

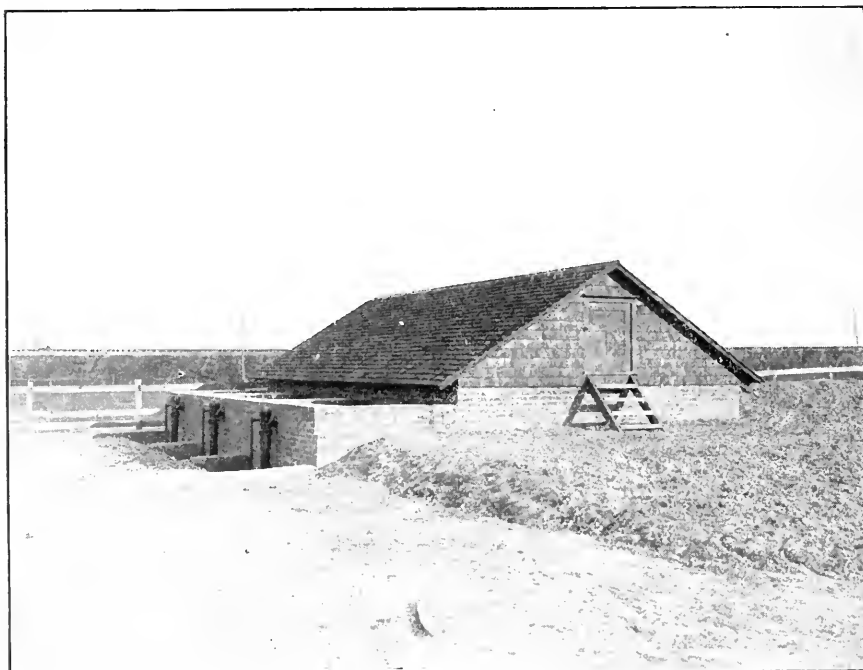
Instead of preparing an acre of poor filtering material, a much greater efficiency would have been obtained by using the same amount of money in the preparation of a much smaller area of good material, properly underdrained. Such material would have been available near at hand.

The field as now prepared, will, however, probably care for the present quantity of sewage which it receives, but it is very desirable to distribute the sewage over the field more thoroughly by keeping it graded in a proper manner; and also to relocate the ditches so that they will be over the underdrains.

The cost of the disposal field, including land, underdrains and grading, was \$800.00. The cost of maintenance is the pay of one man for about two hours each week.



Kenton. General View of Plant. Effluent is Collected in Gutter Running Across Lower Ends of Filters.



Kenton. Septic Tank, "Dosing Filters" and Siphons Which Discharge at Upper End of Main Filters.

KENTON. NORTH DISTRICT.

The city of Kenton, having a population of about 8,000, lies principally in the watershed of the Scioto River; but the northern district, having an area of about 150 acres, drains northward into a county ditch leading into a tributary of the Maumee River.

A public water supply was introduced in 1883. The average daily consumption is now 700,000 gallons or 175 gallons per consumer.

Nearly one-half the total population are connected with the combined sewers which discharge directly into the Scioto River.

The north district is at present but partly sewered; there being about 400 people connected. Measurements showed that the day flow was at the rate of 35,000 gallons per day, which probably means an average actual dry weather flow of about 25,000 gallons per twenty-four hours. The sewers are principally on the separate system, but receive the surface water from one or two catch basins. The quantity used for flushing is estimated at 1,500 to 2,000 gallons per day. As the charge of sewage from the northerly district into the county ditch would have created a nuisance, disposal works were constructed in 1901 at a distance of about one-half mile north of the corporation line.

The plant consists of:

1st. A septic tank 28 feet long, 16 feet wide and 6 feet deep, holding 21,000 gallons, or about one day's flow in dry weather.

2nd. Three dosing filters or "contact filters," which are flush tanks filled with coarse filtering material.

3rd. Three beds of pea coke on to which the sewage is discharged intermittently from the dosing filters.

The septic tank is divided longitudinally by a brick wall and is so arranged that the sewage enters each half at one end and is drawn off at the other end at a point 2 feet below the surface, through small openings into a wooden channel or trough from which it enters the flushing filter by means of inverted siphons.

These flushing filters are 5 feet by 10 feet by 2 feet deep and are filled with a mixture of charcoal, coke and pieces of limestone ranging from one-half inch to three inches in diameter, to a point above the ends of the inlet pipe which are protected by screens. By raising the end of the outlet pipe any of the three filters may be put out of service.

The principal filters or "wave beds" consist of three long brick and concrete tanks, each 10 feet by 100 feet, the bottoms of which have a decided slope away from the septic tank, and which are filled with a layer of pea coke 18 inches deep at the upper end and 4 inches at the lower; the coke is covered with a layer of broken stone.

The sewage from the flushing filter discharges against the upper end of the filtering material, and flows through the inclined layer over the whole distance of 100 feet, when it is collected in an effluent channel and conveyed to the county ditch.

The septic tank is no doubt very efficient as a sludge destroyer. After nearly one and one-half years' operation it contains a foot of sludge at the bottom and no scum at the surface. It is said, however, that when surface water enters the tank a scum quickly forms, but disappears when the flow of surface water ceases.

The dosing filters have given some trouble in clogging around the air pipe of the siphon and thus causing continuous discharge on to the main filters.

Very little care is given to the plant; one man visits it three or four times a month, inspects the working of the siphons, and loosens the filtering material at the upper end of the filters.

Analyses of samples of sewage and effluent collected on November 29, 1902, showed a high percentage of removal of organic matter and a well nitrified effluent, but samples collected on September 18, 1903, showed less organic matter was then being removed and that the effluent was not being nitrified.

The cost of the plant was about \$4,000, and the annual cost of maintenance is estimated at \$50.00.

HARDIN COUNTY INFIRMARY NEAR KENTON.

The Hardin County Infirmary has a population of about 90 and is located about two miles northwest of the city of Kenton, near the Scioto River.

The sewage was formally discharged directly into the river, but in 1898 a system of subsurface disposal was installed.

The sewage is first received in a circular brick settling tank, located near the buildings and about 5 feet in diameter and 10 feet deep, from which it overflows into a flush tank 7 feet in diameter and 10 feet deep. When filled, the latter tank discharges its contents into a 6-inch vitrified pipe leading to the absorption field about 1,500 feet away.

At this field are laid, at a depth of 16 inches, 15 parallel lines of 4-inch tile, 400 feet long and about 15 feet apart. The pipes are laid with open joints and are called absorption drains or distributing pipes, the intention being to have the soil absorb all sewage which finds its way out of them through the open joints.

Beneath this system, at a depth of 3 to 3.5 feet below the surface, is another system of soft tile drains 4 to 6 inches in diameter, for the purpose of lowering the level of the ground water and of receiving the sewage which filters down from the distributing pipes. This system of under-drains discharges into a 15-inch tile leading to the Scioto River, 1,700 feet distant.

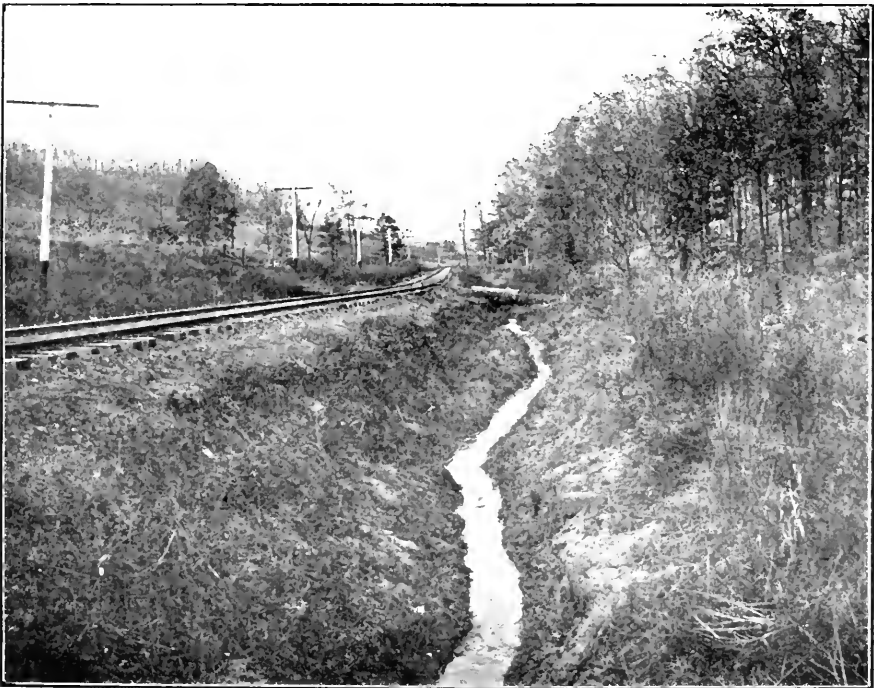
The soil of the absorption field is of a distinctly clayey nature and becomes very compact. A mechanical analysis of it showed the effective size to be 0.02 mm., and the uniformity coefficient 15.

As would be expected from a soil of this nature, the distribution pipes became clogged, especially at the lower ends, and the sewage was forced upward to the surface at the upper part of the field.

With this plant, and even with similar plants located in the most favorable soils, it is necessary to more or less frequently take up, clean, and relay the pipes if satisfactory disposal is to be obtained.



Boys' Industrial School, Lancaster. General View of Filter Beds.



Boys' Industrial School, Lancaster. Stream Which Receives Effluent.

BOYS' INDUSTRIAL SCHOOL NEAR LANCASTER.

The Boys' Industrial School is a state institution located about six miles westerly from the city of Lancaster. The inmates and officers number about one thousand.

In 1897 the institution was attacked by a serious typhoid epidemic which was caused by the pollution of the water supply, then derived from a small surface stream, by the discharge of sewage from the various buildings into the nearest convenient ditches and runs.

Accordingly, in 1899, a new sewerage system, sewage purification works and also a new water supply from deep wells were installed and the general sanitary condition of the institution improved. These improvements, together with its modern system of heating, ventilation and lighting, make it now a model institution.

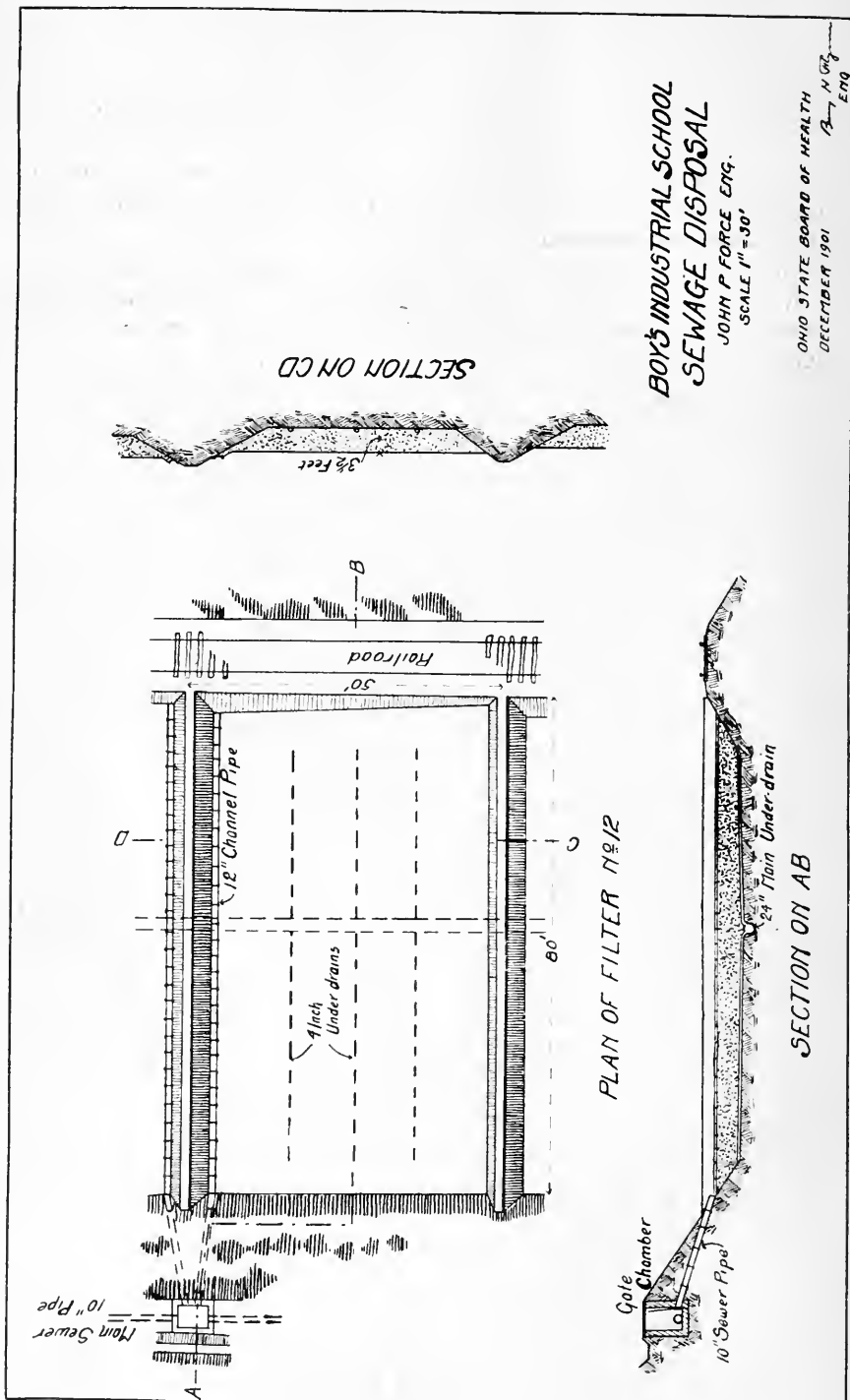
The sewage disposal works consist of intermittent sand filtration beds and are located in a narrow ravine 150 feet lower than and nearly one-half mile from the main buildings. This ravine is also occupied by an electric railway, which materially reduces the space available for the filters and hence accounts for the elongated appearance of the disposal area.

The average flow of sewage, judging from the water consumption, is about 100,000 gallons per day. The operation of the laundry of the institution every day, together with the fact that only ground water is used in the water supply, is said to keep the temperature of the sewage at a sufficiently high degree to prevent serious freezing of the beds in winter.

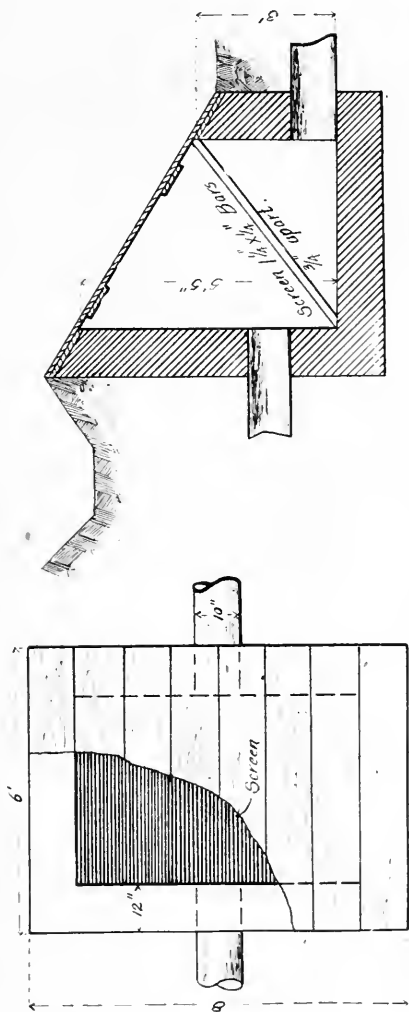
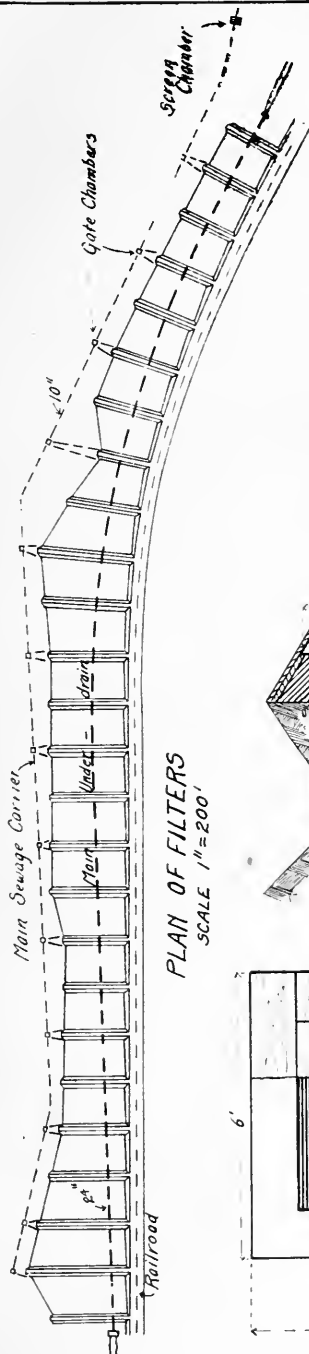
The main sewer, which is 10 inches in diameter, enters a screen chamber at the upper end of the area, where all large solid matter is removed. The screen is composed of iron bars one and one-fourth inch to one-fourth inch set upon edge three-fourths of an inch apart. The screenings are removed and thrown out upon the ground. After passing through this screen chamber the main sewer continues along the foot of a steep hill which forms the side of the ravine. Thirteen gate chambers, each connecting with two filter beds, are placed in the line of the sewer to provide means of directing the sewage to the different beds.

There are 25 filter beds, having a common width of 43 feet, but varying in length from 60 feet to 100 feet, according to the contour of the hill. They have a total effective area, i. e., the area at middepth, of about two acres.

The filtering material is 3.5 feet in depth and is composed of crushed sandstone from a nearby quarry. The material is very uniform in size throughout the beds and contains few large stones, as is the case with the crushed sandstone at the Mansfield Reformatory.



BOY'S INDUSTRIAL SCHOOL
SEWAGE DISPOSAL
JOHN P. FORCE ENG.



OHIO STATE BOARD OF HEALTH
DECEMBER 1901
J. P. FORCE
ENG.

MECHANICAL ANALYSIS OF FILTERING MATERIAL.

	Effective size, mm.	Uniformity coefficient.
Highest bed	0.21	2.0
Lowest bed	0.21	1.9

There is one main underdrain, 24 inches in diameter, extending through all the filters and laid in the bed of a small stream, the flow from which still passes through this drain. The rapid flow down the ravine allows such a drain to operate without interfering with the free filtration through the beds. Three lines of 4-inch underdrains, 10 feet apart, are laid on the bottom of each filter and connected with the main drain.

The sides of the filters consist of earthen embankments having a slope of 1.5 to 1 foot, while the ends are formed by the hill at one end and the railroad embankment at the other.

From the gate chambers the sewage flows through a 10-inch pipe to a 12-inch half-tile carrier at the side of each bed. Pieces of the carriers are broken away at regular distances to allow the sewage to overflow on to the beds.

The bed surfaces are furrowed in winter, but are leveled in summer. Careful attention is given to keeping the beds clean; one man with four or five boys spends about two days per week in scraping the beds, and the scrapings, after being screened in order to save the sand, are thrown out in heaps nearby. They become dry and inoffensive.

Two or three beds are used at a time, and the flow is changed every day. The continuous flow on to a bed while it is in use, instead of the intermittent dosing that would be obtained by means of a flush tank, does not allow as good distribution as the flushing system would secure and it is more difficult to keep the bed surfaces level. But with the ample area of excellent filtering material, which, when clean, permits the sewage to quickly disappear beneath the surface, good results are secured even if the distribution is not very satisfactory.

In winter a coating of ice forms over the beds and serves to protect them, to a great extent, from freezing. If they do freeze the application of the warm sewage thaws them in a short while.

The plant is well designed, and with the exception of not obtaining the best possible distribution over the bed surfaces, is well cared for. So far as can be learned, it is successful in changing all sewage delivered to it to a clear and odorless effluent, and no annoyance is caused by odors from

any part of the plant. Considering the favorable size and quality of the sand a considerably larger amount of sewage might be purified if flush tanks were installed and the beds kept as level as possible.

The cost of the plant was \$8,900. The cost of maintenance, if the value of labor of the boys is included, amounts to twenty-five to thirty dollars per month.

The following analyses of sewage and effluent show the general character of the day and night sewage and also show that the effluent was very well nitrified, although the necessary chemical analyses for determining its organic purity were not made.



Mansfield. General View of Contact Beds. Extent to Which Sewage Covers Surface of Beds is Shown by Light Areas Near Ends of Carriers.

MANSFIELD.

The city of Mansfield has an estimated population of 20,000, and is located in Richland county, near the head waters of the Rocky Fork of the Mohican River, which is a tributary of the Muskingum. The Rocky Fork, just below Mansfield, has a watershed of 30 miles and a dry weather flow of from 1 to 3 cubic feet per second. The nearest point down stream at which the river is used as a public supply is Zanesville, 93 miles distant.

Waterworks were installed in Mansfield in 1870. The average daily consumption is 2,500,000 gallons. About 75 per cent. of the population is supplied with water, which means a daily consumption per consumer of 166 gallons.

The first sewers were built in 1884, on the combined plan; and were gradually increased in an unsystematic way so that in 1899 there were about ten miles of combined and private sewers discharging into Rocky Fork and causing a most decided nuisance. In 1900, large additional areas were sewered and the city was forced by suits to provide for the purification of its sewage. Disposal works were accordingly constructed and put in operation early in 1902.

There are now 25 miles of sewers, 60 per cent. of which, built during the last few years, receive domestic sewage only. On account of the large amount of storm water brought down by the old combined sewers an overflow is built in the main trunk sewer leading to the pumping station at the purification works, so that in time of storm the excess flow, consisting of a mixture of storm water and sewage, is discharged directly into the creek. Besides the storm water, the sewers receive much ground water leakage, and it is said that several large springs are drained into them. This makes the sewage very dilute at all times. About 10 per cent. of the total flow comes from the "High Level District" which has recently been sewered and from which the sewage passes directly to the septic tank at the works, without pumping, through an 8-inch siphon 1,600 feet long and passing under the Pennsylvania Railroad tracks. The difference in elevation of the two ends of the siphon is 5 feet. A large part of the future sewage of the city will reach the works in this manner.

The average flow reaching the works through both sewers is, by weir measurements, about 1,000,000 gallons per day, and is fairly constant the year around. There is no record of sewer connections, but it is estimated that the sewers are used by 8,000 or 10,000 people. No manufacturing wastes are discharged into the sewers.

The purification works are located on a fourteen and one-half acre tract of land three-fourths mile southeast of the center of the city, between

the Pennsylvania Railroad and Rocky Fork. There are no houses in the immediate neighborhood.

The method of purification is by septic treatment followed by oxidation in contact beds of cinders one-eighth inch to one-half inch average diameter, prepared by especially designed crushers and screened to remove all particles less than one-eighth inch.

The principal trunk sewer discharges into a pump well which is provided with a grating of iron bars having a three-fourth inch open space, in order to keep out the larger solid matter in the sewage. Two 7-inch centrifugal pumps, having a daily capacity of 2,000,000 gallons, and operated by 25 h. p. engines, raise the sewage into the septic tanks.

The pumping station is a neat brick building which, in addition to its pumping machinery, contains a garbage crematory where all the refuse of the city is burned. The stack is placed directly over the sludge well, and connected to it is a vent from the septic tank, so that odors from both garbage and sewage are carried off without offence.

The septic tanks are four in number; each is 50 by 100 feet, and 7 feet deep, and holds 250,000 gallons, thus giving a total tank capacity of 1,000,000 gallons or 24 hours flow under present conditions. No tests have been made to see whether better results could not be obtained by putting one or two tanks out of service and thus obtaining a shorter septic treatment. The sewage enters each tank at four equidistant points, 3 feet below the surface, and is drawn off through a horizontal slotted pipe placed 3 feet below the surface into an outside chamber, the discharge from which is controlled by an automatic device operated by floats, which keeps the discharge constant although the flow into the tanks varies from hour to hour. This necessitates a daily variation in the elevation of the surface of the sewage of about 6 inches, but apparently does not interfere with septic action.

The effluent from the septic tank is aerated by falling through a distance of several feet into the main outlet channel and also by passing over a series of steps called the "aerating chamber."

The contact filters are five in number, each of which has an area of one-fourth acre and contains about 5 feet of cinders, as above described. The total filtering area is laid out in the form of a circle, covering one and one-fourth acres, so that each bed forms a sector of this circle. In the center of the circle is a small brick house containing the automatic apparatus which controls the flow on to and from the filters.

The under drains are of vitrified pipe of different sizes, laid with open joints and arranged according to a system of branches and sub-branches in order to conform to the peculiar shape of the bed. The tops of the drains are below the bottom of the beds and are laid so that the regulating apparatus will keep them back flooded, the idea being to prevent the sewage, when first applied to an empty bed, from filtering through into the underdrains too rapidly and without sufficient purification.

The operation of the beds is described as follows: The septic tank

effluent, after passing through the aerator, flows to the automatic regulating apparatus, and from there on to one of the five beds. Each bed is connected with the float chamber of the automatic apparatus so that when the bed becomes filled, that is, when it has received its proper dose, the float rises and by means of cog wheels turns two cylinders, the first of which controls the flow on to the beds, while the second controls the flow from the beds. These cylinders are so connected that, as one bed becomes filled, the following three effects are produced:

- 1st. The flow is diverted to another bed.
- 2d. The sewage is held in the bed just filled.
- 3d. The bed which next before received sewage, and which had been holding it in contact with the cinders, is allowed to drain. The time of contact is about four and one-half hours.

After about one year's use, one of the septic tanks was drained and found to contain but a few inches of solid matter at the bottom, and only a slight scum had formed on top.

The cost of the plant was as follows:

Septic tank	\$17,700 00
Building	12,500 00
Machinery (including crematory)	7,500 00
Filter beds	18,800 00
Land	6,650 00
Engineer's plans	2,663 00
Superintendence of construction.....	4,810 00
	<hr/>
	\$70,623 00

Also,

Iron siphon	\$2,700 00
Right of way	2,700 00
One mile of force main	6,800 00
Expenses of Sanitary Board, inspection trips, etc	4,270 00
	<hr/>
	\$16,470 00
Grand total.....	\$87,093 00

The cost of operation is the salaries of four men, fuel, etc., which amounts to \$4,000.00 per year.

Representative samples covering twenty-four hours were collected in September, 1902, and in January, 1904, the analyses of which are shown below.

For convenience in making rough comparisons, the figures are averaged. The results of the examination in September, 1902, if taken by themselves, would show a greater per cent. of purification.



Mansfield. Pumping Station and Garbage Crematory.



Mansfield. Interior of Septic Tank.



CHEMICAL EXAMINATION OF SEWAGE
(Parts per Million.)

No. of Sample.	Description of Sample.	Date and Hour of Collection.	Color.	Turbidity.	Sediment.	Odor.	Oxygen Required.
2474	Sewage—Main sewer ..	Sept. 8, '02, 7 a.m.-6 p.m.	30 dk	.....	sl.	5 oily	59.99
2477	Sewage—Main sewer ..	Sept. 8-9, '02, 7 p.m.-6 a.m.	23	.....	sl.	5 oily	48.45
3465	Sewage—Main sewer ..	Jan. 27, '04, 8 a.m.-8 p.m.	40	.....	cons.	3 sew.	13.80
3468	Sewage—Main sewer. .	Jan. 27-28, '04 9 p.m.-8 a.m.	30	.....	distc't	2 sew.	6.20
		Average.....	31	.....	.....	.....	32.11
2475	Sewage— Exit septic tank. ...	Sept. 8, '02, 7 a.m.-6 p.m.	35 dk	.....	sl.	5 oily	19.89
2478	Sewage— Exit septic tank. ...	Sept. 8-9, '02, 7 p.m.-6 a.m.	35 dk	.....	sl.	5 oily	16.90
3466	Sewage— Exit septic tank. ...	Jan. 27, '04, 8 a.m.-8 p.m.	40	.....	cons.	3 sew.	11.52
3469	Sewage— Exit septic tank. ...	Jan. 27-28, '04, 9 p.m.-9 a.m. ...	30 off	.....	distc't	4 sew.	10.92
		Average.....	35	.....	.....	.....	14.81
2476	Effluent from works...	Sept. 8, '02, 6 p.m. ....	.....	.....	.....	.....	2.47
2479	Effluent from works...	Sept. 8-9, '02, 6 a.m. ....	.....	.....	.....	.....	4.00
3467	Effluent from works...	Jan. 27, '04, 8 a.m.-8 p.m.	20	8	v. sl.	2 oily sew.	3.80
3470	Effluent from works...	Jan. 27-28, '04, 9 p.m.-8 a.m.	10	tr.	v. sl.	2 oily sew.	3.28
		Average.....	.....	.....	.....	.....	3.39

OHIO STATE REFORMATORY AT MANSFIELD.

This institution is located a few miles north of the city of Mansfield, on a large tract of land which drains into the Rocky Fork of the Mohican, the same stream which receives the effluent from the municipal sewage purification works just southeast of the city. The flow of this stream is very small in dry weather and is entirely unsuited to receive raw sewage. Sewage purification works were therefore installed in 1896 at about the same time that the institution was built. There is now a population of six to seven hundred at this place and the flow of sewage is estimated at 60,000 to 70,000 gallons per day.

The sewage, excluding cellar and roof drainage, from all departments is collected in a 15-inch outfall sewer and conveyed to the works which are located 900 feet west of the main building, on low land near the creek, into which the purified effluent is discharged.

The sewage first passes to a gate chamber where it can be diverted to the filter beds direct, or to either one of two grit and screen chambers, both of which are connected to a combined storage and flush tank. The screen and grit chambers are provided in duplicate so that one side at a time may be used, allowing the other to be cleaned, etc. These chambers, together with the tank, are included in a large underground chamber 6 by 18 feet in plan and 10 feet deep from the crown of the arched roof, constructed with 16-inch brick walls, 12-inch brick arched roof and 12-inch concrete bottom. It is divided into five chambers by 12-inch brick walls 7 feet high. Two of these, into which the sewage first enters, are 30 by 18 inches in plan, and each connects with a separate chamber 5 feet by 2.5 feet in plan. The smaller of these are grit chambers, intended to receive heavy sediment, the larger are the screen chambers and one contains a wire screen with a 1-inch mesh placed in a horizontal position. The sewage enters the small chambers at the top, flows downward and enters the screen chamber near the bottom, passes up through the screen and flows to the flush tank. This is 9.5 feet by 6 feet in plan and 4.5 feet deep at the flow line, giving a capacity of about 2,000 gallons. It is provided with an 8-inch Van Ranken automatic siphon, also with a 15-inch overflow and with a 15-inch drain at the bottom, the latter being fitted with a gate valve and leading to the outfall pipe below the overflow connection so that it can be used to convey the sewage direct to the filters in case of accident to the automatic flushing apparatus.

From the bottom of each of the main screen chambers a 12-inch pipe leads to a third screen chamber, of smaller size, located several hundred feet away on the low ground. When either of the main screen chambers becomes filled with sludge it is drained to the third screen chamber



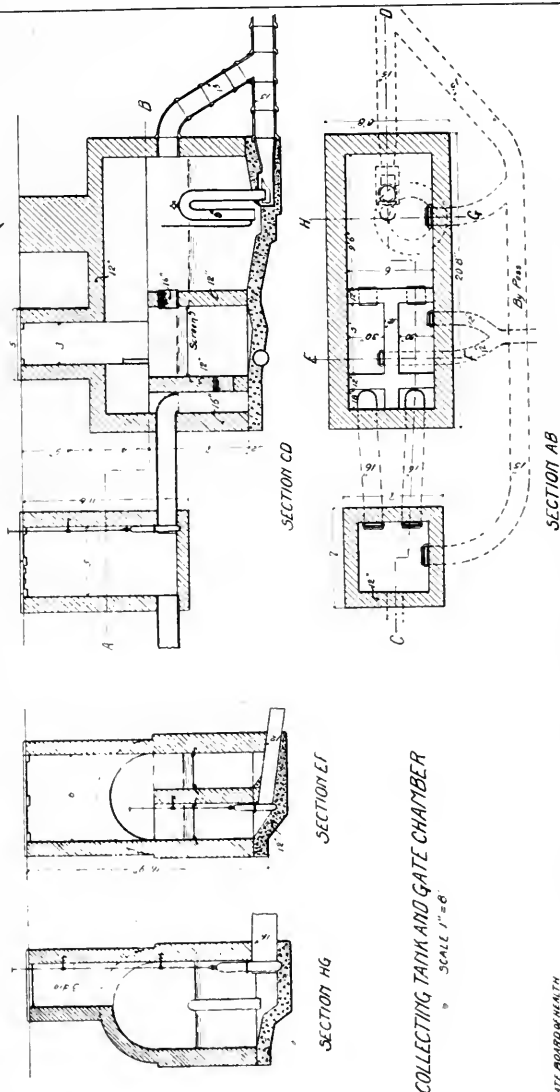
Ohio State Reformatory, Mansfield. General View of Filter Beds and Buildings.



Ohio State Reformatory, Mansfield. Sewage on West Bed.

MAINSFIELD REFORMATORY
SEWAGE DISPOSAL

JOHN P. FORCE ENG.
FEBRUARY 1902.



where as much solid matter as can be held back by a screen of 1-inch space is removed and thrown out upon the ground. The liquid sludge containing much solid matter flows directly into the creek and causes very objectionable deposits along its banks.

The filtration area is 1.1 acres in extent and is divided by 6-foot embankments, containing the distribution pipes, into two main filters, one of which is sub-divided into three and one into four parts, so that for practical purposes there are seven filters each of about one-sixth acre.

The filtering material is 5 feet in depth and is composed of crushed sandstone; the work of crushing having been done by the prisoners. The following analyses represent the size of the material, except that there are many stones from 1 inch to 4 inches in diameter scattered through the material which were not included in the samples. Except for these stones the material is unusually good for sewage purification.

MECHANICAL ANALYSIS OF FILTERING MATERIAL
FROM MANSFIELD REFORMATORY.

Depth	Effective Size, mm.	Uniformity Coefficient
Surface	0.23	1.6
0.5	0.23	1.8
1.0	0.23	1.7
2.0	0.21	1.9

The beds are underdrained with lines of 4-inch tile, 20 feet apart, leading to a main 8-inch underdrain. It is said that some trouble has been caused by the clogging of these drains and that they have had to be taken up. This is unusual with filtering material of this character.

The surfaces of the beds are kept furrowed, the depth of each furrow being about 1.5 feet deep and the distance from ridge to ridge nearly 4 feet. These furrows prevent the full area of the bed surface from being utilized and thus cause the beds to become clogged much sooner than they would if the sewage were spread evenly over the entire available surface, Although smaller furrows are valuable in keeping the beds from freezing in winter, furrows as large and as wide as those at Mansfield are probably not of great benefit in this respect, as the beds freeze in winter and the sewage runs directly to the creek. This may also be due to the fact that the automatic flushing device has not been used, but the sewage has been allowed to flow continuously. As the flow of sewage, and night flow especially, is small the beds are given a good chance to freeze.

Deposits accumulate rapidly on the furrows and the entire time of one man is necessary to keep the beds clean, although it rarely has been possible to secure a man who is faithful in giving the beds the proper attention.

The beds should be kept level except in freezing weather and the sewage evenly distributed over them. The automatic flush tank should be used and a sludge bed should be constructed to receive the sludge from the screen chambers instead of discharging it into the creek. If this is done and faithful and regular care is taken in cleaning the beds, there is no reason why the plant should not be entirely successful, although as the present amount of sewage increases it will probably be desirable to increase the filtering area or to construct sedimentation or septic tanks for the preliminary removal of a larger part of the solid matter that is now being removed by the screens.

The effluent appears clear and odorless when inspected and the following analyses of effluent show that a considerable nitrification takes place as the sewage passes through the beds.

CHEMICAL EXAMINATION OF EFFLUENT
(Parts per Million.)

No. of Sample.	Description of Sample.	Date and Hour of Collection.	Color.	Turbidity.	Sediment.	Odor.	Oxygen Required.
416	Effluent.....	Ind. May 4, 1899, 9:20	35	very slight.	s.	mouldy	8.54
475	Effluent.....	Ind. May 29, 1899, 6:05 p.m.....	50	very slight	s.	strong musty	5.87
2216	Effluent, day.....	Comp. May 27, 1902, 7 a.m. to 6:15 p.m	42	.16	s.	2 musty	7.44
2219	Effluent, night.....	Comp. May 27-28, 1902, 7 p.m. to 6 a.m	41	.16	v. s.	ft. musty	7.12
2220	Effluent.....	Comp. May 27, 1902, 6 a.m.....	.....	.....	.....	.....	.....
2221	Effluent.....	Ind. May 27, 1902, 12 a.m.....	.....	.....	.....	.....	.....
2222	Effluent.....	Ind. May 27, 1902, 6:15 p.m.....	.....	.....	.....	.....	.....
2223	Effluent.....	May 27, 1902, 12 p.m.....	.....	.....	.....	.....	.....

The cost of the plant would be hard to determine, as the labor, by far the chief item, was supplied by the prisoners. Exclusive of labor the cost is estimated as follows:

FROM OHIO STATE REFORMATORY.

(Parts per Million.)

Nitrogen as				Chlorine.	Alkalinity.	Increasing Constituents.	Solids.		Loss on Igni- tion.		No. of Sample.
Alb. Ammonia.	Free Ammonia.	Nitrites.	Nitrates.				Total.	Suspended.	Total.	Suspended.	
.561	4.750	.112	11.14	82.0	79	68	513	.....	176	.....	416
.280	1.760	.190	22.98	66.4	71	30	567	.....	269	.....	475
.630	3.350	.100	9.60	43.8	78	.....	350	.....	84	.....	2216
.770	4.065	.160	10.00	40.8	78	.....	403	.....	156	.....	2219
.....	.....	.....	9.00	45.8	.....	.....	.....	.....	.....	.....	2220
.....	.....	.....	8.80	45.8	.....	.....	.....	.....	.....	.....	2221
.....	.....	.....	10.00	40.6	.....	.....	.....	.....	.....	.....	2222
.....	.....	.....	11.20	39.6	.....	.....	.....	.....	.....	.....	2223

Sewers to works \$4,000 00
 Screen chambers, flush tank, underdrains and pipes for beds 1,000 00
 Total \$5,000 00

As stated above, the entire time of one man should be devoted to its maintenance in order to insure success.

MASSILLON STATE HOSPITAL AT MASSILLON.

This hospital is built on the cottage plan and covers a considerable area, thus making nearly a mile of sewers necessary. The average population is about 1,000 including inmates and officers. The institution is situated upon a hill a few miles south of the city of Massillon and drains into a small tributary of the Tuscarawas River.

The average flow of sewage is estimated at about 100,000 gallons per day. The strength and rate of flow varies greatly during the day.

The purification works consist of a storage reservoir, or flush tank, and intermittent sand filters, supplemented by a broad irrigation field.

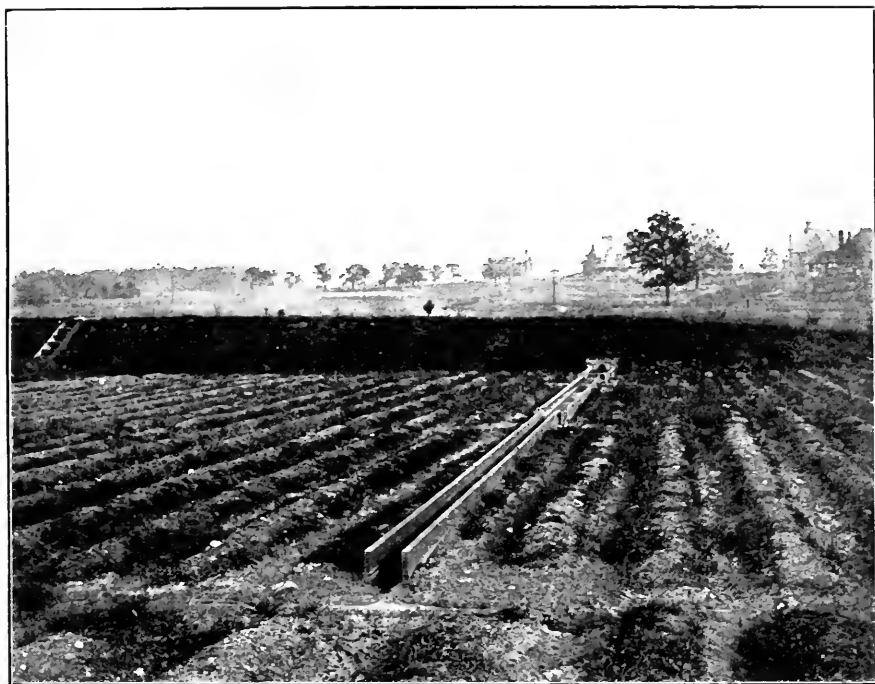
The sewage from the institution is conveyed through a 10-inch sewer to the reservoir located about midway between the buildings and the filter beds. This reservoir is built of brick, 40 feet by 15 feet, with an average depth of 5.5 feet, thus making a capacity of 25,000 gallons. A basket shaped screen, having 1-inch open spaces, is placed at the inlet to intercept the large pieces of solid matter. When filled, the reservoir discharges automatically on to the filter beds. This occurs with the present flow about four times during the twenty-four hours. A connection with the water works of the institution is provided in order to flush out any deposits which may remain in the tank. -

The topography makes it necessary to connect the tank with the beds by means of a siphon. As this was to be subjected to less than a 10-foot head, it was built of vitrified pipe in 3 feet lengths and 10 inches in diameter. The total length is about 400 feet.

The filter beds are four in number, each about 100 feet square, making a total area of one acre. The natural soil in the bottom of the filters was formed into two waves or depressions, the sides of which slope 6 inches in 25 feet. In the bottom of each depression, which are 50 feet apart, is a line of 4-inch tile underdrain on a grade of one foot in five hundred.

The filtering material consists of sand and gravel taken from nearby pits. It has an average depth of 4.5 feet and is placed in the filter as follows: First, a layer of coarse screened gravel, 8 inches deep, directly over the drains, and 4 inches at points one-half way between. Over this is placed a 3-foot layer of finer gravel upon which is a 1-foot layer of sand.

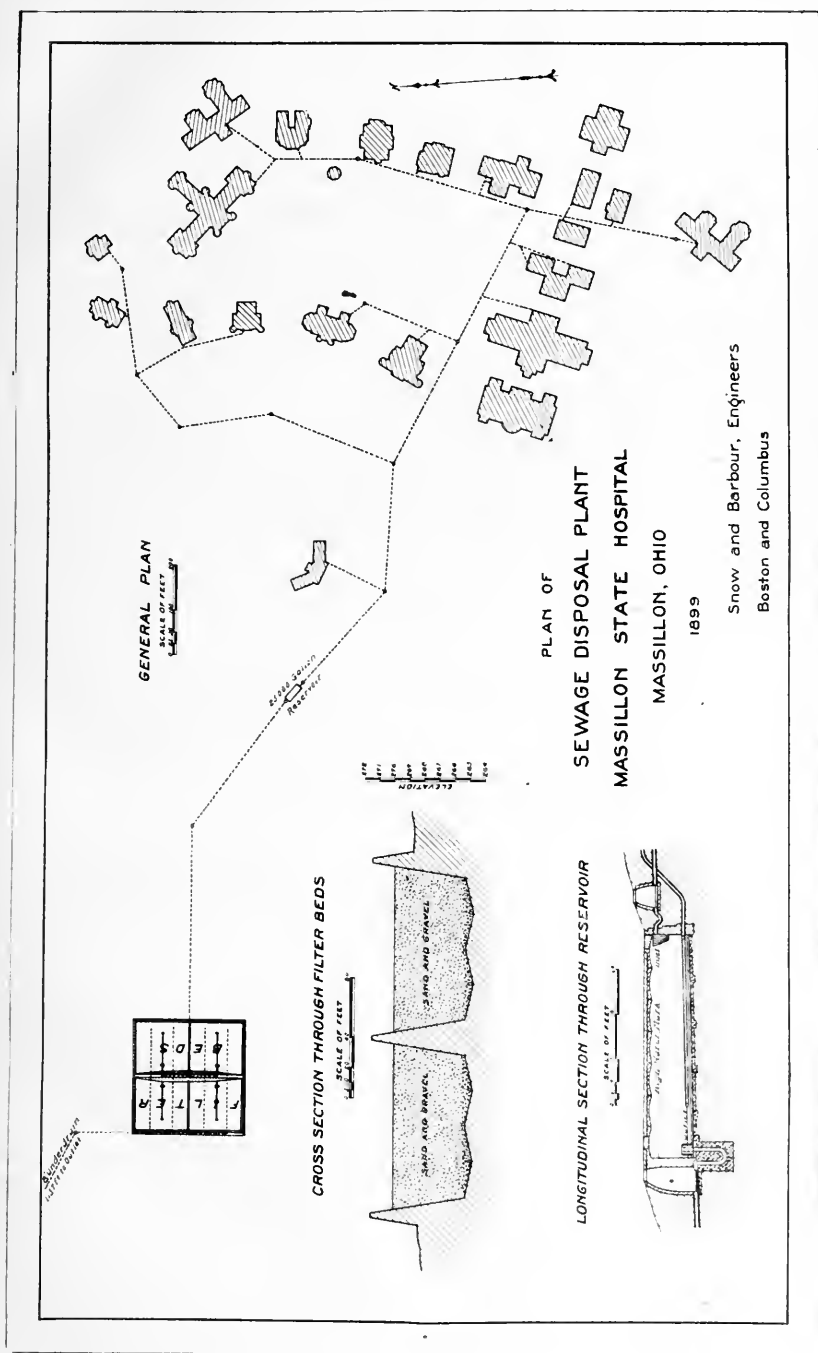
During the search for suitable filtering material some sands were found which when dry appeared to be very good, but when wet they became plastic, owing to the calcium carbonate and other chemical constituents contained in them.



Massillon State Hospital, Massillon. View Showing Method of Applying Sewage to Beds.



Massillon State Hospital, Massillon. Cleaning Filter Beds.



The following analyses indicate in a general way the character of the material in use. The samples we collected in November, 1903.

MECHANICAL ANALYSIS OF FILTERING MATERIAL FROM MASSILLON
STATE HOSPITAL.

	Northeast Bed.		Southwest Bed.	
Depth.	Effective size. mm.	Uniformity coefficient.	Effective size. mm.	Uniformity coefficient.
Surface.	0.33	6.0	0.30	7.0
0.5	0.59	7.6	0.30	5.7
1.0	0.62	11.6	0.70	8.3
3.0	0.90	6.7	0.55	9.1

Owing to the removal of some of the top sand during scraping, and also on account of furrowing the beds, the coarser material appears nearer the surface than it did originally.

The sewage is conveyed to the different beds through pipes laid in the dividing embankments, which are constructed of the soil excavated in building the beds and sodded.

The surface of the beds is kept furrowed both in winter and summer and the sewage is distributed through wooden troughs and cross furrows. A better distribution of the sewage, as well as a better effluent, might be obtained if the beds were leveled off in summer, but this treatment tends to prevent freezing in winter.

The flow is turned upon different beds every few days. One dose or discharge from the reservoir reaches a bed four times in 24 hours, and would cover it, if the surface were level, to a depth of about 4 inches each time. The duration of each discharge is about 30 minutes.

The beds are given a thorough scraping four times during the year. A total of several inches of sand has been removed at these times, although the practice at other places proves that with proper care such removal of sand is not necessary. Twenty acres or more of grass land are available for the broad irrigation area, which is adjacent to the filter beds on the southerly and westerly sides. The soil on this area has an effective size of about .03 mm. and a uniformity coefficient of 4.00, while the sub-soil has an effective size of .06 mm. and a uniformity coefficient of 2.33. A gate, placed in a manhole in the sewer leading to the beds, affords means by which the sewage can be diverted into ditches and distributed over the irrigation area. This area has been developed only to a small extent and is said to be used only to relieve the filters when the latter are being cleaned or are frozen.

At least one inspection has shown that the effluent was clear and odorless, and the samples collected November 18, 1903, show that the filters were producing an effluent which was probably well enough purified to be safely discharged into the stream which receives it, but which was not as good as might be produced by the excellent filtering material.

The cost of the plant was as follows: .

Sewers	\$4,068 86
Reservoir	1,055 18
Filter beds	4,131 00
Total	<u>\$9,255 04</u>

Of the first item, "sewers," only about \$300 can be properly included in the disposal works, so that the cost of the works alone was about \$5,500. This does not include engineering fees. The cost of operation is hard to determine, as the labor of the patients costs the institution nothing, and it is the custom to use, in cleaning the beds, a large number of men for short periods. To receive proper results with a plant of this size one man should give his entire time to it.

CHEMICAL EXAMINATION OF SEWAGE AND EFFLUENT FROM MASSILLON STATE HOSPITAL.

(Parts per Million.)

No. of Sample.	Description of Sample.	Date and Hour of Collection.	Color.	Turbidity.	Sediment.	Odor.	Oxygen Required.
3264	Sewage—Main sewer. .	Nov. 18, 1903, forenoon	off	100 whitish	con.	5 sew.	72.00
3267	Sewage—Main sewer. .	Nov. 18, 1903, afternoon	off	200 whitish	con.	4 sew.	11.82
3265	Sewage— Entrance to beds.	Nov. 18, 1903, 9 a.m.	off	475 brown'h	con.	5 sew.	81.90
3268	Sewage— Entrance to beds.	Nov. 18, 1903, 3:30 p.m.	25	270	con.	4 sew.	5.40
3266	Effluent.	Nov. 18, 1903, 9 a.m.	10	tr.	slight	5 musty	3.74
3269	Effluent.	Nov. 18, 1903, 3:30 p.m.	15	tr.	slight	4 musty	9.40

(Parts per Million.)

Nitrogen as				Chlorine.	Alkalinity.	Incrusting Constituents.	Solids.		Loss on Igni tion.		No. of Sample.
Alb. Ammonia.	Free Ammonia.	Nitrites.	Nitrates.				Total.	Suspended.	Total.	Suspended.	
12.600	10.500	none	none	29.6	251	52	1,751	427	767	326	3264
2.490	7.750	none	none	51.6	274	8	575	131	263	213	3267
4.750	11.000	none	none	39.2	375	none	913	229	390	172	3265
3.320	9.600	none	none	28.8	409	none	592	82	227	95	3268
.480	3.450	.050	3.0	29.0	397	none	460	12	98	.....	3266
.740	4.580	.250	6.0	33.8	406	none	498	6	87	.....	3269

OBERLIN.

Oberlin, a village having a population of 5,000, is located in the north-central part of the State, in Lorain County. Plum Creek, a small intermittent stream, tributary to Black River, passes through the village. The city of Elyria has, until recently, obtained its water supply from the Black River at a point about ten miles below Oberlin.

A public water supply was installed at Oberlin in 1887, and is now used by about 60 per cent. of the population. The average daily consumption is 134,000 gallons, or 45 gallons per consumer. A water softening plant, the first of its kind in use for a public supply, has recently been constructed.

The first sewers were laid in 1892, and purification works were built two years later. There are now discharging at the works ten miles of strictly domestic sewers, two miles of which are in the trunk line. Storm water, and also water collected by five miles of cellar drains, is discharged directly into the creek. There are about 650 sewer connections, all from dwelling houses, used by 3,000 people. The average daily flow of sewage determined by a large number of weir measurements, is 200,000 gallons per day. On account of leakage, this amount is much increased at times. Up to 1902, however, the flow averaged 100,000 gallons or less.

Intermittent filtration and broad irrigation was the method adopted for purifying the sewage. The village bought a twenty acre tract of land, bounded on the north by the Elyria pike and located one and one-half miles east of the built-up part of the town. The country here is very sparsely settled and the nearest house is 700 feet distant. Of the twenty acres purchased only six acres, bordering on the creek and a considerable distance from the road, were at a low enough elevation to receive the sewage by gravity. Three and one-half acres of this area have been divided into twelve beds and underdrained for intermittent filtration, while one and three-fourths acres have been ditched, but not underdrained, for broad irrigation.

The natural soil upon the prepared area is a sandy loam. The filter beds have been prepared by simply grading, building separate embankments 1 foot high and then laying agricultural tile 2.5 inches to 4 inches in diameter, three feet below the surface and twenty feet apart, the trenches being filled with puddled earth to a depth of two feet over the tile to prevent unpurified sewage from washing through. The top soil was stripped off only in places where this was necessitated by the grading.

On reaching the filtration area the sewage enters one of two settling basins, each 3 feet deep and 10 by 30 feet in area, consisting simply of an excavation in the earth with sides boarded up. From this it overflows and passes into distributing ditches which convey it either to the broad irriga-

tion area or to the filter beds; distribution to any bed being effected simply by damming up the proper ditch with a shovelful of earth. Corn and other vegetables were grown on the filters for a time, but the increased amount of sewage has now prevented anything but grass from being successfully raised. The land is used for pasturage, however.

The care of this sewage farm has generally consisted, first, in removing the accumulation from the settling basin by pumping it into a tank-wagon and depositing it upon the land away from the prepared area; and, second, in directing the sewage upon the proper beds. When the flow was 75,000 gallons per day, an average of 300 gallons of sludge was pumped out daily. Before the farm was overworked by the present large flow of sewage it took less than one-half the time of one man to take care of it.

For the last two or three years, however, since the flow has been more than 100,000 gallons per day, the farm has ceased to be efficient as a filtration plant. Therefore, during the summers of 1902 and 1903, and also at previous times, in order to keep the sewage from polluting the creek, suphate of aluminum has been mixed with the sewage at the rate of about 100 pounds per day. This was done by means of an automatic apparatus located in a manhole on the trunk sewer. This chemical causes precipitation of solid matter in the settling tank and also on the filtration area which is often flooded, so that the clarified sewage overflows into the creek. The beds are not scraped, but when clogged are allowed to stand idle until the solid matter breaks up and mingles with the soil. In other plants it has been found that thorough scraping and removing of the deposits is a decided advantage to the operation of the beds.

There is a difference of opinion in regard to the odor from the plant, but it is probable that the sewage remaining on the beds and also the cleaning of the sludge basins must have caused disagreeable odors as far as six or seven hundred feet away, depending, of course, on the wind and atmospheric conditions.

There is no doubt that the plant has done good work, but that it is now overburdened and that little purification except that effected by the chemicals is obtained. Realizing this, the village authorities have recently bought a one hundred acre tract a short distance further down stream from the present works. The soil of the new area is similar to that of the old, being fine clayey sand. About twenty acres of it is available for use without pumping.

Samples analyzed chemically by the State Board of Health in 1894, showed a reduction of albuminoid ammonia on two different occasions of 85 per cent., and a reduction of oxygen required of 73 per cent. and 50 per cent. This village report contains the following results of samples analyzed:

EXAMINATION OF SAMPLES OF SEWAGE FROM OBERLIN.

(Parts per Million.)

	Free Ammonia.	Albuminoid Ammonia.	Total Solids.	Oxygen Consumed.
Sewage	26.256	16.080	42.336	111.35
Effluent .....	.918	.343	1.261	5.10
Per cent removal.....	96	98	97	95

In 1895 the State Board of Health, on request of certain people living along the creek, made an investigation regarding its pollution, but found no cause for complaint.

In 1897 samples of the sewage, effluent and creek, were collected and examined by C. Arthur Brown, bacteriologist employed in connection with a suit threatened against the village by certain farmers below town. At this time no sewage was overflowing into the creek.

The following results were obtained :

TABLE SHOWING NUMBER OF BACTERIA PER CC.

Source	Sept. 27	Oct. 5	Dec. 30
Creek above farm	33,387	138,330	3,750
Sewage at exit from settling basin.....	2,531,270	3,008,330	3,439,150
Average effluent from underdrains	208,762	204,165	212,325
600 feet below farm	22,395	75,000	95,400
One mile below	2,162	5,750	4,625

The per cent. of purification thus obtained by filtration on the three dates was 92.76, 93.21 and 94.83 respectively. A still greater reduction in the number of bacteria at various points down stream together with inspection shows that there was no possibility, at that time, of the effluent causing a nuisance.

The cost of the works was \$2,490.00; of which \$1,500 was paid for land and \$990 for preparing it.

The annual cost of maintenance is \$250.00. At first this was paid for labor, while more recently a large part of it was used for chemicals.

OHIO SOLDIERS' AND SAILORS' HOME AT SANDUSKY.

This Home has a population of 1,400, and is located three miles south of the city of Sandusky.

The sewage was formerly discharged into a small stream leading to a swamp located between the Home and Lake Erie. On account of the offensive conditions created in this swamp, sewage purification works were built in the spring of 1903.

Judging from the daily water consumption, the flow of sewage is 100,000 to 125,000 gallons per day. There is not much opportunity for leakage, and the sewage is fairly strong. The flow per capita is about 75 gallons per day.

The purification works, consisting of septic tanks and sand filter beds, are located 1,500 feet from the main institution buildings, but only 600 to 700 feet from the nearest dwellings.

There are two septic tanks each 26 by 40 feet and 7 feet deep; either one or both can be used. When one is used, the septic period is about twelve hours and when both are used it is about twenty-four hours.

After passing through a grit chamber and screen having a one-half inch open space, the sewage enters the tanks 3 feet below the surface and leaves it at the same depth at the other end.

It is then aerated by passing through 100 feet of galvanized iron gutter from which it overflows in thin streams into a shallow basin and is conveyed into a dosing tank. At first the basin under the aerating gutter was filled with broken stone or other coarse material in order to obtain further aeration; but it was found that this material quickly clogged and had to be removed.

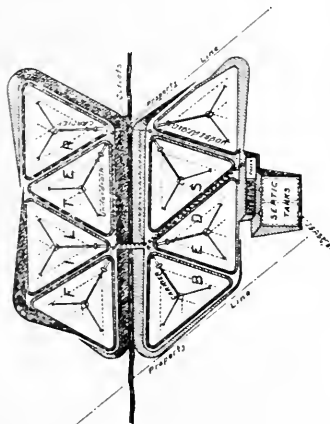
A direct connection from tank to brook is provided for emergency use. The sand filters are of triangular shape, eight in number, each one-eighth acre in area. The filtering material is about 4 feet deep; the upper 3 feet 9 inches is of clean lake sand having an effective size of 28 mm., and a uniformity coefficient of 1.61. The underdrains are 4 inches and 6 inches, laid in depressions in the bottom of the beds and surrounded by screened gravel and a layer of gravel is spread over the entire bottom of each filter. The sewage is distributed over the surfaces of the beds by means of wooden sluices with gates at several points.

An automatic apparatus, located in the dosing tank, discharges the sewage in doses of 7,500 gallons, successively, through four "dosing conduits." Each of the conduits terminate in a small gate chamber from which sewage is delivered to one of two beds. This arrangement enables four beds to be used on alternate days; and also provides for the automatic dosing, in rotation, of the four beds in use at any time. This means that

PLAN OF
SEWAGE DISPOSAL PLANT
OHIO SOLDIERS AND SAILORS HOME
ERIE CO., OHIO

1903

Snow and Barbour, Engineers
Boston and Columbus



PLAN OF DISPOSAL PLANT

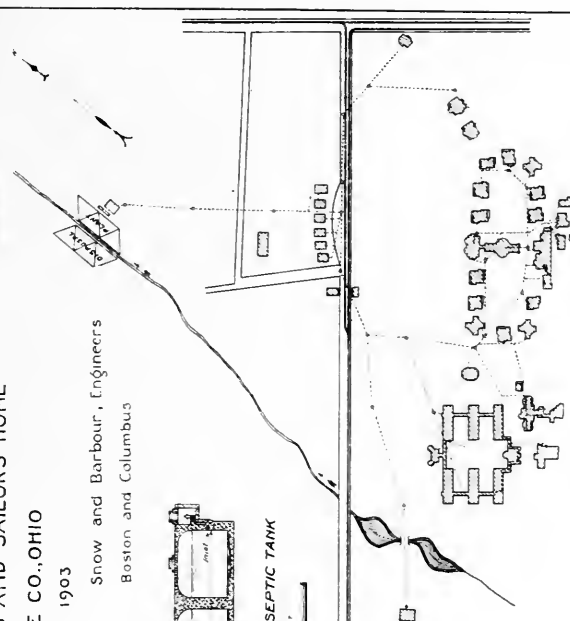
SCALE OF FEET
0 10 20 30 40 50



SECTION THROUGH SEPTIC TANK

SCALE OF FEET
0 10 20 30 40 50

GENERAL PLAN
SCALE OF FEET
0 10 20 30 40 50



SECTION THROUGH FILTER BEDS

SCALE OF FEET
0 10 20 30 40 50

each bed is covered to a depth of about 3 inches, three or four times each day.

The plant had only been in operation about six months when inspected. During that time it was found that an excellent effluent was produced, but that the beds needed considerable attention on account of clogging caused by the finely divided solid matter in the septic sewage. It was further found that a twenty-four hour septic period with this sewage produced odors which were objectionable to occupants of houses 600 to 1,000 feet away, while a twelve-hour period created much less odor. After six months of operation the septic tank, operated most of the time with a twelve-hour period, contained a heavy scum on top and more or less deposit in the bottom. It had not been necessary to clean it out, however, and no means of draining the tank by gravity have been provided.

By neglecting to take the proper precautions of furrowing the sand surfaces previous to cold weather, the beds were allowed to freeze and become useless.

The cost of the plant exclusive of engineering and new sewers, was about \$12,800.00, divided as follows:

Land	\$2,000 00
Filters	7,560 00
Tanks and dosing chambers	3,240 00
	<hr/>
	\$12,800 00

The cost of operation consists of the labor of one man all the time, with the occasional help of two or three more.

The following analyses have been made of samples collected by the attendant in charge of the plant. The samples are made up of hourly portions and represent the day flow only:

**CHEMICAL EXAMINATION OF SEWAGE AND EFFLUENT FROM OHIO
SOLDIERS' AND SAILORS' HOME AT SANDUSKY.**

(Parts per Million.)

No. of Sample.	Description of Sample.	Date and Hour of Collection.	Color.	Turbidity.	Sediment.	Odor.	Oxygen Required.
3311	Sewage—Main sewer. .	Composite. Dec. 2, '03, 7-11 a.m.	20	950	much	4 sew. leathery	117.68
3315	Sewage—Main sewer. .	Dec. 2, '03, 12 m.-4 p.m.	20	800	much	4 sew.	49.76
3312	Sewage— Exit septic tank. . .	Dec. 2, '03, 7-11 a.m.	30	550	con.	4 sew.	43.20
3316	Sewage— Exit septic tank. . .	Dec. 2, '03, 12 m.-4 p.m.	28	550	con.	4 sew.	47.08
3314	Effluent	Dec. 2, '03, 7-11 a.m.	20	tr.	s.	leathery.	7.30
3318	Effluent	Dec. 2, '03, 12 m.-4 p.m.	20	tr.	s.	2 oily, musty	7.64

(Parts per Million.)

Nitrogen as				Chlorine.	Alkalinity.	Incrusting Constituents.	Solids.		Loss on Igni- tion.		No. of Sample.
All, Ammonia.	Free Ammonia.	Nitrites.	Nitrates.				Total.	Suspended.	Total.	Suspended.	
9.760	9.660	none	none	49.8	92.0	152	5,239	4,707	4,854	4,584	3311
8.330	6.500	none	none	96.0	146.0	.....	2,145	1,659	745	544	3315
11.040	14.500	none	none	47.4	220.0	none	1,076	702	684	571	3312
13.160	16.200	none	none	47.2	227.0	none	1,165	847	726	598	3316
.680	4.100	.150	18.00	48.9	78.0	72	577	.....	141	.....	3314
.460	4.700	.130	17.0	53.4	297.0	83.0	639	.....	198	.....	3318

SHELBY.

The village of Shelby has an estimated population of about 5,000, and is located in Richland County at the head waters of the Muskingum River, on Black Fork Creek, a small stream having, at this place, a watershed of about forty square miles, and a dry weather flow of perhaps 1 to 3 cubic feet per second. The next point below on the stream where it is used as a public water supply is Zanesville, over one hundred miles distant.

A public water supply taken from driven wells was introduced in 1897, and is now used by 3,500 people. The average daily consumption is 1,000,000 gallons or 280 gallons per consumer.

The sewerage system and disposal works were built in 1899 and 1900. There are eighteen miles of sewers, all on the separate plan, which have 300 connections, representing about 1,500 people. In addition, there is a large tube works which discharges waste water containing large quantities of iron and acid into the sewers; thus seriously affecting the character of the sewage. There is also considerable infiltration of ground water into the sewers; so that the sewage is fairly dilute. The flow is about 250,000 gallons per day.

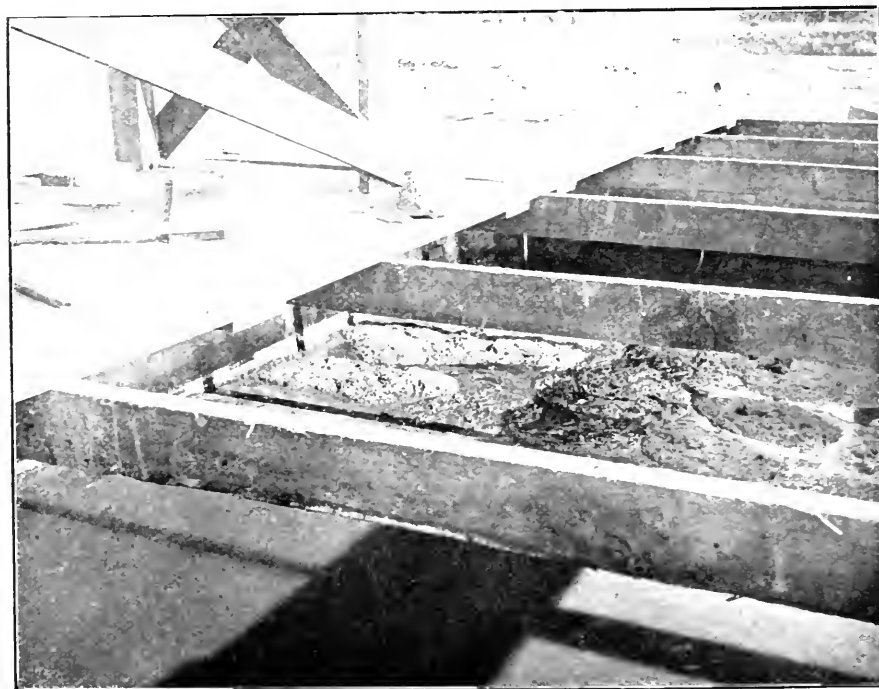
The sewage disposal plant is located some three miles north of the village on a twenty-five acre farm owned by the village, adjoining the Big Four Railroad. Black Fork Creek passes through this farm. There are few houses within two or three miles, and the nearest is 1,000 feet distant.

The method of purification is intermittent filtration through cinders and gravel, after preliminary settling in two sedimentation tanks and a large reservoir excavated in the natural soil and holding some five days' flow of sewage. A by-pass in the main sewer just above the works makes it possible to turn the sewage directly into the creek; this is said to be rarely done, however.

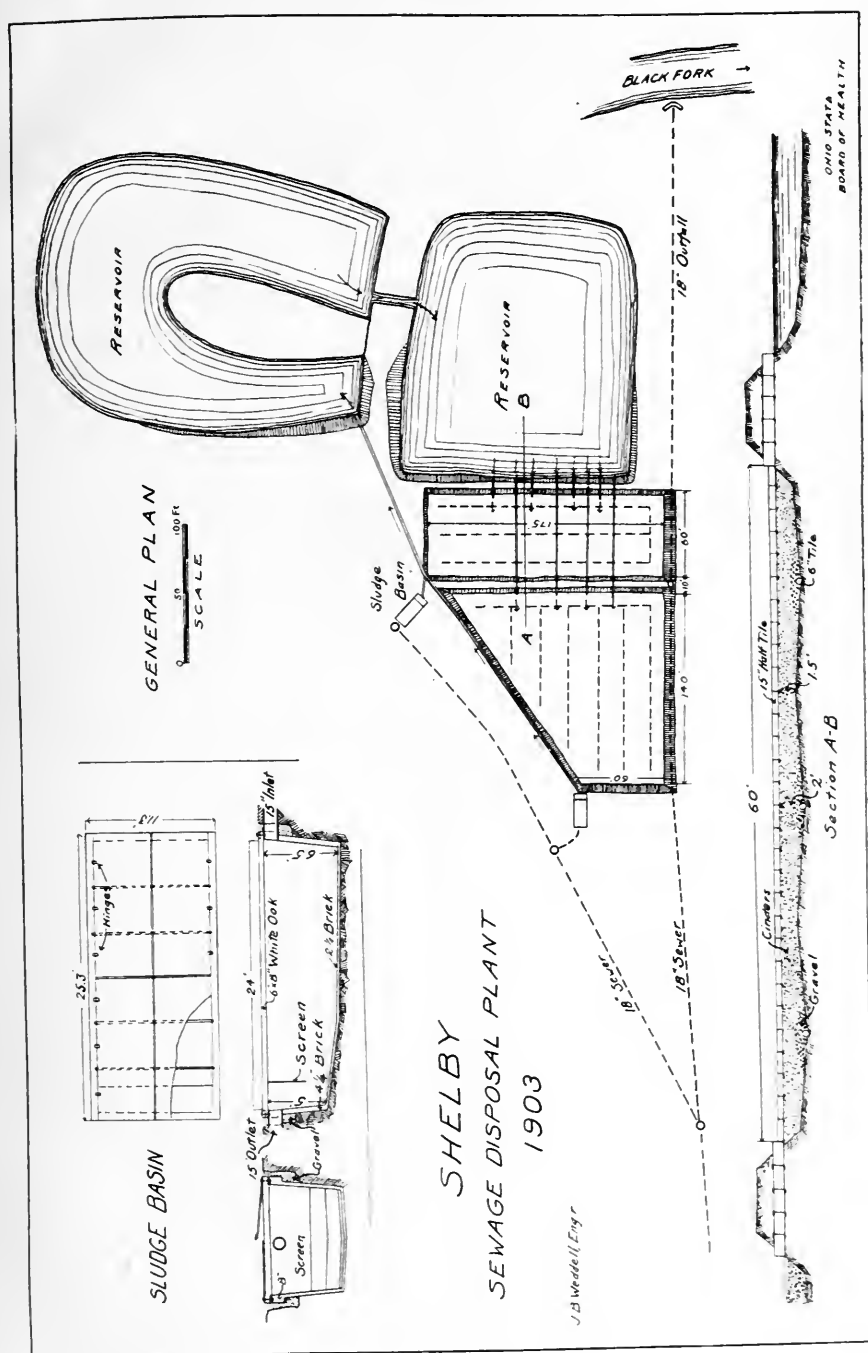
Each of the two sedimentation tanks is of brick, 10 feet by 24 feet by 6 feet deep, with a capacity of about 8,000 gallons; they are provided with wooden covers. The sewage enters and leaves the tanks through 15-inch pipes near the top; a wire screen one-half inch mesh being placed over the outlet pipe. No provision is made for draining out the sludge by gravity, but it has to be pumped by hand into tank wagons and is used on the farm for fertilizer. Generally, only one tank is used at a time. The average period during which a tank can be used without cleaning is two months, at the end of which time there is an accumulation of three or four feet of sludge at the bottom. The sewage is about three hours in reaching the disposal works. Previous to the introduction



Shelby. General View of Filter Beds. Platform Over Tank in Distance.
Underdrain Inspection Holes Shown in Left Hand Bed.



Shelby. Sedimentation Tank. In Upper Corner is Shown Foot of Platform
upon Which Pump is Placed for Cleaning Tank.



of the acid iron waste into the sewers, it was necessary to clean out the tanks much less frequently. This indicates that whatever septic or sludge destroying action was then developed (although chemical analyses do not indicate that there was much septic action) is now prevented or seriously interfered with by the acid sewage from the iron works.

From the sedimentation tanks, the sewage flows into a large open reservoir about two acres in extent, and one to two feet deep. This holds at least five days' flow of sewage. It was constructed in order to give the iron in the sewage an opportunity to oxidize and precipitate before the filtered sewage was discharged into the creek, as there is much complaint about the discoloration of this stream caused by the oxidized iron. Very little such oxidizing action takes place, however, in the reservoir, as it is probable that the organic matter, rather than the iron, takes up the available oxygen; but the sewage on flowing from it is clear and contains much less organic and suspended matter than at its entrance to the reservoir.

When the plant was first started, the effluent from the sedimentation tank was discharge directly on to the filters; it quickly clogged the latter however, and a rough shallow reservoir having a capacity of 200,000 to 300,000 gallons, or one day's flow, was dug in the clayey soil. The use of this reservoir prevented clogging of the filters, though considerable solid matter had to be removed from the bottom of the reservoir itself, from time to time. With the reservoir enlarged as at present, no serious deposits have yet occurred.

There are two filters with areas of 10,000 and 15,000 square feet respectively, or a total area of nearly .6 acres. Six-inch underdrains, 20 feet apart, are laid in depressions in the natural clay, and upon each is placed a six-inch layer of gravel 6 or 8 feet wide. A 1.5 foot layer of small cinders is then laid over the whole filter, making the filtering material 2 feet deep over the drains and 1.5 feet midway between them.

MECHANICAL ANALYSIS OF FILTERING MATERIAL

	Effective Size, mm.	Uniformity Coefficient.
Gravel covering .....	.43	7.0
Cinders .....	.24	18.7

The sample showed that the cinders had become much disintegrated and mixed with the fine material from the gravel covering.

Each underdrain is provided with an inclined cleaning pipe and also with an inspection hole. The joints are laid as closely as possible and are wrapped with cheese cloth.

The sewage is distributed over the surface of the filters through half-tile carriers 20 feet apart. As above stated, before the use of the large

settling reservoir, the filters had to be cleaned often, but they are now given little attention except an occasional weeding. The sewage is allowed to flow one bed for two or three weeks at a time. To this mode of operation, as well as to the presence of iron in the sewage, is probably due the failure to obtain a nitrified effluent.

On reaching the creek, the effluent immediately turns a brownish-red color and this discolors the water for several miles downstream, as above mentioned. It is only since the iron factory was connected with the sewer system that this discoloration has occurred.

There is surprisingly little odor to this plant in spite of the fact that such a large area of sewage is constantly exposed to the air. The chief source of odor is the cleaning of the tanks, but this, on account of the isolated location, causes no complaints.

The following samples have been analyzed by the Board:

CHEMICAL EXAMINATION OF SEWAGE

(Before Admission of Acid

(Parts per Million.)

No. of Sample.	Description of Sample.	Date and Hour of Collection.	Color.	Turbidity.	Sediment.	Odor.	Oxygen Required.
2042	Sewage—Main sewer. .	Dec. 28, '01, 8 a.m.-7 p.m.	15	73	con.	3 sew.	11.73
2045	Sewage—Main sewer. .	Dec. 28-29, '01, 8 p.m.-7 a.m. . . .	16	135	con.	oily	28.51
2168	Sewage—Main sewer. .	May 7, '02, day.	37	300	con.	4 sew.	26.11
2172	Sewage—Main Sewer..	May 7-8, '02, night.	20	98	con.	4 sew.	11.38
2043	Sewage— Exit from settling tank	Dec. 28, '01, 8 a.m.-7 p.m.	18	90	con.	musty, ft.oily	13.09
2046	Sewage— Exit from settling tank	Dec. 28-29, '01, 8 p.m.-7 a.m.	17	73	con.	musty, oily	9.63
2169	Sewage— Exit from settling tank	May 7, '02, day.	22	20	dec.	4 sew.	5.73
2173	Sewage— Exit from settling tank	May 7-8, '02, night.	20	16	dec.	3 sew.	8.53
2170	Sewage—After about 24 hours sedimentation in reservoir.	May 7, '02, day.	20	sl.	sl.	3 sew.	5.41
2174	Sewage—After about 24 hours sedimentation in reservoir.	May 7, '02, night.	22	sl.	sl.	3 sew.	6.22
2044	Effluent from works...	Dec. 28, '01, 8 a.m.-7 p.m.	6	tr.	mere tr.	ft. musty	2.43
2047	Effluent from works...	Dec. 28-29, '01, 8 p.m.-7 a.m.	5	tr.	mere tr.	ft. musty	3.01
2171	Effluent from works...	May 7, '02, day.	19	tr.	tr.	1 musty	3.78
2175	Effluent from works...	May 7-8, '02, night.	18	tr.	tr.	1 musty	2.90

AND EFFLUENT FROM SHELBY.

Iron Wastes Into Sewers.)

(Parts per Million.)

Nitrogen as				Chlorine.	Alkalinity.	Incrusting Constituents.	Solids.		Loss on Ignition.	
Alb. Ammonia.	Free Ammonia.	Nitrites.	Nitrates.				Total.	Suspended.	Total.	Suspended.
1.404	2.740	.100	.92	27.8	197	349	1,044	.....	.....	.....
1.608	2.560	.070	.88	22.5	187	332	1,188	.....	.....	.....
2.780	3.800	none	tr.	27.6	270	210	1,042	.....	275	.....
1.350	3.930	.056	.35	47.6	252	.....	914	.....	252	.....
.896	3.520	.076	.88	27.3	197	360	1,035	.....	.....	.....
.632	2.508	.060	.92	23.5	183	345	928	.....	.....	.....
2.260	3.450	.060	.50	25.4	246	208	851	.....	225	.....
.960	3.370	.052	.50	37.0	252	.....	860	.....	273	.....
.750	2.830	.062	.50	29.7	235	198	846	.....	208	.....
.780	3.090	.054	.55	28.3	239	.....	832	.....	259	.....
.260	2.580	.076	.56	23.7	197	360	960	.....	.....	.....
.268	3.100	.032	.64	25.7	183	350	951	.....	.....	.....
.360	2.800	.060	.40	32.0	230	223	817	.....	208	.....
.336	3.280	.110	.60	29.7	214	.....	805	.....	246	.....

CHEMICAL EXAMINATION OF SEWAGE AND EFFLUENT FROM SHELBY.
(After Acid Iron Wastes Had Been Discharged Into the Sewers
for Several Months.)
(Parts per Million.)

No. of Sample.	Description of Sample.	Date and Hour of Collection.	Color.	Turbidity.	Sediment.	Odor.	Oxygen Required.
3359	Sewage—Main sewer. .	Dec. 15, '03, 2 p.m. ....	.....	.....	.....	.....	307.00
3360	Sewage—Exit from settling tank	Dec. 15, '03, 2 p.m. ....	.....	.....	.....	.....	129.00
3361	Sewage—Exit from settling tank after about 5 days sedimentation in reservoir.	Dec. 15, '03, 2 p.m. ....	.....	.....	.....	.....	33.00
3362	Effluent.	Dec. 15, '03, 2 p.m. ....	.....	.....	.....	.....	24.80

(Parts per Million.)

Nitrogen as				Chlorine.	*Alkalinity.	Increasing Constituents.	Solids.		Loss on Ignition.		Iron.
Alb. Ammonia.	Free Ammonia.	Nitrites.	Nitrates.				Total.	Suspended.	Total.	Suspended.	
1.890	3.560	none	0(?)	.....	acid 4,430	.....	7,397	173	1,826	.....	100 plus
1.700	3.610	tr.	0(?)	.....	acid 1,456	.....	2,558	437	801	.....	100 plus
1.200	2.150	.024	0(?)	.....	acid 990	.....	1,523	224	412	.....	100 plus
.300	3.150	.018	0(?)	.....	acid 13	.....	1,534	201	309	.....	100 plus

*The acid determinations are approximate.

The cost was as follows:

Sand (25 acres)	\$2,500 00
Tanks and beds	3,000 00
Reservoir (about)	1,000 00
Cost of works proper	6,500 00
About three miles of outfall sewer with right of way	14,000 00

The cost of maintenance is the use of the farm, which is equivalent to about \$100.00 per year.

TOLEDO STATE HOSPITAL AT TOLEDO.

This institution has a population of nearly 2,000. It is built upon the cottage plan and therefore requires some two miles of sewers, which formerly discharged directly into Swan Creek. The flow of sewage is estimated at 150,000 to 200,000 gallons per day.

Disposal works were built in 1897, intermittent filtration and broad irrigation methods being adopted. The sewage on reaching the works first enters a gate chamber, for which a screen having a three-fourths inch space is provided, but not always used. Here the flow can be directed to the filter beds or to a circular collecting tank of 50,000 gallons capacity, from which it can be pumped, by means of a gas engine and centrifugal pump, to an irrigation field, 23 acres in extent and underdrained with 3-inch tile, 16 feet apart. This field is thoroughly cultivated each year and the sewage applied to it when needed for the crops.

The filter beds are fifteen in number and have a total area of about seven acres. They are located on a steep slope on the bank of Swan Creek, and are constructed simply by building dividing embankments, leveling the bed surfaces and laying underdrains about 20 feet apart, at a depth of 3 to 4 feet.

The soil is a fine clayey sand and in places it is almost entirely clay. Mechanical analyses of samples from different filter beds gave the following results:

MECHANICAL ANALYSIS OF FILTERING MATERIAL FROM
TOLEDO STATE HOSPITAL.

	Effective Size. mm.	Uniformity Coefficient.
Bed No. 2.....	.04	5.2
Bed No. 2.....	.03	6.3
Bed No. 5.....	.02	8.5
Bed No. 6.....	.04	4.7

When the beds become so coated with solid matter that the sewage cannot pass through within a reasonable time, it is the custom to harrow the surfaces so that this scum is broken up and mixed with the sand instead of being removed from it. This has caused an accumulation of filth at and near the surface of the beds, which, with the natural fineness of the material, seriously interferes with filtration.

No definite facts could be obtained, but it is probable that on account of the small filtering capacity of the beds, and also because only as much sewage is pumped to the irrigation field as is best suited to the needs of the crops, sewage from the institution is discharged directly into the creek for a large part of the time. In winter the beds become frozen and are not used at all.

The plant, then, cannot be said to be efficient in purifying the sewage. It is probable that if the sewage were subjected to preliminary sedimentation to remove as much as possible of the solid matter, and if care were taken to keep the bed surfaces free from deposits, better results might be obtained, and the beds could be made to be of use in winter. The fineness and character of the material are not favorable for the best results, however, and only the most constant and intelligent care can make the beds accomplish their purpose of purifying the sewage of the institution at all times

The cost of the materials used in the construction of the plant was about \$3,000. The labor was furnished by the patients of the institution.

The cost of maintenance consists of the value of the whole time of one of the patients.



Trumbull County Infirmary, Warren. View Showing Pump House (Small Building in Center) and Main Infirmary Buildings.



Trumbull County Infirmary, Warren. General View of Filter Beds.

TRUMBULL COUNTY INFIRMARY AT WARREN.

The infirmary has a population of 80 to 90 and is located a few miles north of Warren on Young's Run, a small tributary of the Mahoning River.

Formerly the sewage, as well as the drainage from pig-pens, barn-yards and slaughter houses, was allowed to flow directly into the run, thus grossly polluting it for stock watering purposes as well as endangering the water supply of Warren, the intake for which is located about three miles below, following the stream and river.

The county commissioners were sued and forced to improved these conditions. Accordingly, the location of the pig-pens, and similar sources of pollution, was changed and a purification works was installed, in the spring of 1899, for the disposal of the sewage.

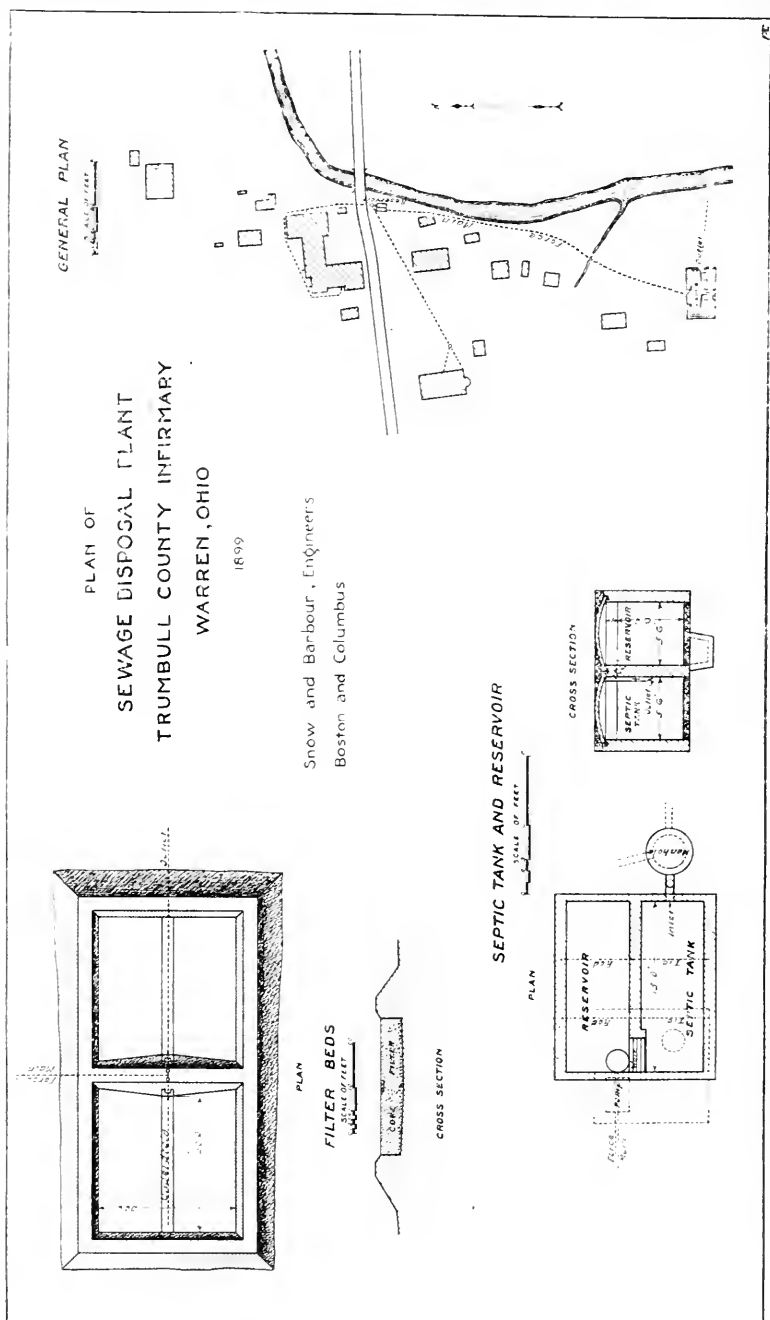
The works consist of, first, a septic tank and a storage reservoir placed side by side underground and covered at one end by a pump house; and, second, of two coke filters.

The flow of sewage is ordinarily two thousand to three thousand gallons per day, but this amount is greatly increased during wet weather, and when the run is in flood, by leakage into the sewers. At such times it is necessary to discharge the sewage directly into the stream.

The septic tank and reservoir are located only about 150 feet from the main building. They are both built of brick with concrete bottoms. The tank is 15 feet long, 5 feet wide, average depth below flow line 5.3 feet and has a capacity of about 3,000 gallons, or a little more than a day's flow. The reservoir is of the same dimensions in plan, but being a little deeper it has a capacity of nearly 4,000 gallons. Thus the average age of the sewage before being pumped to the filter is about two days.

The sewage enters the septic tank from the eight-inch main sewer through an elbow extending 2.5 feet below the surface. No screen is used for the removal of any of the solid matter. The sewage overflows from the tank at a corner opposite the inlet, over a series of steps three feet long and designed to allow aeration of the septic sewage. This overflow is trapped by a piece of sheet iron and a vent pipe enters the tank near this point. The tank can be drained through a sluice gate into the reservoir.

In the pump house is located a 50,000 gallon steam pump, which is supplied with steam from the power and heating plant several hundred feet distant. The pump house is ventilated into the stack at the power plant. About once a day, or whenever the reservoir is full, the pump is started by the attendant in charge and the sewage is pumped from the reservoir through 600 feet of three-inch wrought iron force main to the filter beds.



The lift is from 10 to 16 feet according to the level of the sewage in the reservoir. If the pump is not started, the reservoir, on becoming filled, overflows into the stream.

The filters, two in number, are located near the run, 600 feet south of the tank. They are each 30 feet by 30 feet; both at top and bottom and contain five feet of filtering material over the underdrains and four and one-half feet near the sides. A single line 4-inch underdrain passes through both beds. The filtering material is described as follows: over the underdrain at the bottom of the center of each bed is placed a six-inch layer of coarse coke, which layer diminishes to zero thickness at the sides, thus making the top of it level. Upon this is placed four and one-half feet of fine crushed coke or "coke breeze."

The force main is extended to the center of the separating embankment where it divides into two two-inch pipes, each provided with a valve so that the sewage may be directed to either bed desired. At first the two-inch pipes were slotted with three-eighths inch openings on the under side, but these soon clogged and the sewage is now discharged through the end of the pipes on to the center of the concrete slabs, 4 feet wide, which extend across each bed directly over the underdrain and serve to distribute the sewage as well as to keep it from filtering too rapidly into the drains. The distribution effected by this means is not very efficient, however.

Neglecting the periods during which the sewage runs directly to the stream, the filters are operated when the flow is 2,500 gallons per day, at the rate of 62,500 gallons per acre per day. The duration of the daily dose is about one hour and the effluent appears in the underdrain within thirty minutes after pumping is commenced. Sometimes both beds are used and at other times one bed is allowed to rest for a week or so while the other is used. Very little attention is given to cleaning the bed surfaces and weeds are allowed to grow and the sludge allowed to accumulate. It is said that they receive a thorough cleaning twice a year. On account of the coarse material and the small flow of sewage this lack of care, though not desirable, does not clog the surfaces enough to prevent the sewage from passing through freely. In winter the beds freeze between doses, but readily thaw when the sewage is applied.

During their four and one-half years of use, the works have satisfactorily purified the sewage except when the flow was increased to beyond their capacity. The long period in the septic tank and reservoir does not appear to have interfered with the subsequent oxidation of the sewage.

The septic tank has been cleaned but once. The sludge in the bottom retains a constant depth of about one foot, and the scum at the surface is three to four inches thick.

The odor arising from the tank and reservoir, however, is very strong and the gases have seriously attacked the iron of the pump. If

it had not been possible to secure ventilation for the pump house, a serious nuisance would probably have been created for the occupants of the nearby buildings.

The following are the analyses of samples collected at various times. They show that the sewage undergoes considerable, but by no means complete, nitrification. They also show that the nitrification is much greater in the sewage which has stayed longest in the filter.

CHEMICAL EXAMINATION OF SEWAGE AND EFFLUENT
(Parts per Million.)

No. of Sample.	Description of Sample.	Date and Hour of Collection.	Color.	Turbidity.	Sediment.	Odor.	Oxygen Required.
2771	Sewage—Main sewer. .	Composite sample Apr. 29, 1903	90 off	225	con.	5 sew.	66.06
3245	Sewage—Main sewer. .	Composite sample Nov. 11, 1903	high	200	con.	5 sew.	13.28
2772	Sewage— Entrance to beds	April 29, 8:30 a.m.	45 off	150	sl.	5 sew.	31.34
3246	Sewage— Entrance to beds	Nov. 11	high	200	con.	5 sew.	69.20
2773	Effluent	Apr. 29, 9 a.m.	11	none	tr.	v. ft. musty	7.23
2775	Effluent	Apr. 29, just before eff. ceased to run . . . . .	.....	.....	.....	.....	.....
3247	Effluent	Nov. 11	10	v. s.	tr.	2 musty	9.24

No figures are available as to the actual cost of the works, but the following is the estimated cost previous to construction. This closely approximates the actual cost. A large amount of labor was furnished by the inmates and is not included in the estimate.

Sewer	\$ 52 00
Reservoir septic tank, pump and piping	512 00
Force main	87 00
Filter beds	410 00
Ten per cent. contingencies	106 00
Total	\$1,167 00

FROM THE TRUMBULL COUNTY INFIRMARY.

(Parts per Million.)

Nitrogen as				Chlorine.	Alkalinity.	Incrusting Constituents.	Solids.		Loss on Igni- tion.		
Alb. Ammonia.	Free Ammonia.	Nitrites.	Nitrates.				Total.	Suspended.	Total.	Suspended.	
3.140	2.680	none	none	52.5	153	16	752	315	282	.....	.....
9.920	52.800	none	none	69.6	486	.....	809	182	230	72	.....
3.530	19.230	none	none	40.8	187	12	460	115	176	.....	.....
6.620	56.300	none	none	69.8	614	.....	817	143	256	80	.....
1.420	.578	.160	38.0	29.5	29	105	376	.....	87	.....	.....
.....	.....	.150	72.0	27.4	.....	.....	.....	.....	.....	.....	.....
.784	2.874	.340	32.0	56.6	60	.....	902	.....	58	.....	.....

The cost of maintenance consists of the value of the steam for pumping and the time of one man for not more than one-half hour each day.

WESTERVILLE.

The village of Westerville has an estimated population of 1,500, and is located in Franklin County, on Alum Creek, a stream having a watershed of about 150 square miles, ten miles below Westerville. This stream is used as a partial source of water supply by the city of Columbus.

A public water supply was introduced in 1901. In 1902, four and one-half miles of sewers and a disposal plant were constructed, although previous to that time there had been some private and storm sewers discharging sewage directly into the creek. There are twenty-one houses and one creamery connected with the sewers, representing probably about 100 people. The creamery waste consists of the washings from milk cans, which considerably increase the organic matter in the sewage. The daily flow of sewage is 20,000 to 25,000 gallons.

The disposal plant is located upon a three acre lot just south of the corporation line, on the bank of a small run leading to Alum Creek, and is 300 or 400 feet distant from the nearest house. It is hidden from the view of any part of the village by a steep bank. The system of purification is septic treatment followed by oxidation in cinder contact beds, and additional filtration through cinders.

There are two septic tanks, each 8 feet by 26 feet in area and 8 feet deep; holding together 25,000 gallons, or slightly more than a day's flow. The sewage enters and leaves the tanks at about mid-depth. After more than a year's operation there is no scum and a deposit of only 10 inches at the bottom of the tank. Aerating steps having a fall of 2.5 vertical feet are constructed at the exit from the tank.

The contact beds are six in number, while the plans provide for building three more. Up to the present time but three of the beds have been used. Each contains 3 feet of screened cinders and has an effective area, that is, mean of top and bottom areas of .021 acres. The specifications require the cinders to be from one-eighth inch to one inch in diameter, and prohibit the use of material having more than 20 per cent. of 1-inch pieces, or more than 5 per cent. of dust.

Each bed is drained by one 8-inch underdrain and two sets of 6-inch laterals, and the sewage is distributed over the surface through half tile carriers.

For controlling the operation of the beds, automatic apparatus is provided, the principal features of which are:

- 1st. An automatic distributor which receives the flow from the septic tank, and which contains three outlets, each leading to a special contact bed; and three float chambers each connected with a special contact bed by a small pipe entering the bed near the surface.

2d. Three automatic discharging siphons, one at the outlet of each bed. The compressed air under the bell of each siphon is controlled by a valve, which in turn is controlled by a float regulated by the height of sewage in one of the other three beds. The effect which the apparatus is designed to produce is this; when one bed is filled to the proper level the flow of sewage is diverted to another bed, while the bed next previously filled is caused to drain. Thus, at any time, one bed is being filled, one standing full, while the third is either draining or standing empty.

When it becomes necessary to use a group of three more beds, similar apparatus will be used with them. This regulating system, though cleverly designed, has not continued to work entirely satisfactorily, but if the attendant in charge of the beds was fully instructed regarding its adjustment and operation there is no reason why this should not be successful. At the time the samples (the analyses of which are below) were collected, more or less sewage was continuously passing through all three contact beds.

At a lower level than the three contact beds is a cinder filter 13 feet square at the bottom and 31 feet square at the top, and 6 feet deep, which is operated continuously. There is a similar filter, not yet used, connected with three unused contact beds. Each filter is drained by an 8-inch tile passing through its center. The sewage is distributed through half-tile carriers, but the surface of the bed is never entirely covered, as the sewage disappears very rapidly through the coarse material. A large portion of the surface of both contact beds and filters was frozen when inspected.

The effluent appears clear, odorless and well nitrified, and there is apparently no clogging of the beds in spite of the fact that the contact bed principle has, at least at times, been replaced by a continuous filtration. The sewage, however, is rather weak as regards ordinary domestic wastes, although the waste from the creamery increases the amount of organic matter in it.

The contract price for the disposal works proper was \$2,900. This consisted of septic tank, eight filters and apparatus. The cost of operation amounts practically to the time of one man about two hours a month. Much more attention should be given the plant; not only in inspecting the working of the automatic apparatus, but also in seeing that a proper distribution of sewage over and through the beds is obtained.

The following samples were collected and analyzed:

CHEMICAL EXAMINATION OF SEWAGE AND EFFLUENT FROM WESTERVILLE.

(Parts per Million.)

No. of Sample.	Description of Sample.	Date and Hour of Collection.	Color.	Turbidity.	Sediment.	Odor.	Oxygen Required.
3505	Sewage—Main sewer. .	Composite Feb. 10, '04, 1-5 p.m.	30 off	308	con.	3 sew.	167.88
3506	Sewage— Exit septic tank.	Feb. 10, '04, 1-5 p.m.	30 off	60	con.	sew.	42.82
3507	Effluent.	Feb. 10, '04, 1-5 p.m.	tr.	tr.	v. sl.	none	2.20

(Parts per Million.)

Nitrogen as				Chlorine.	Alkalinity.	Incrusting Constituents.	Solids.		Loss on Igni- tion.		No. of Sample.
Alb. Ammonia.	Free Ammonia.	Nitrites.	Nitrates.				Total.	Suspended.	Total.	Suspended.	
9.605	5.750	.016	none	79.2	501	198	1,588	116	652	106	3505
2.110	4.250	.046	none	42.4	475	212	1,158	12	342	36	3506
.240	.636	.026	4.0	39.4	388	214	1,100	.....	292	.....	3507

NOTE.—No. 3505 is not representative of the average character of the sewage, which was unusually strong when the sample was collected

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